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No. 87-

IN THE
Supreme Court of the United States
OCTOBER TERM, 1987

DRESSER INDUSTRIES, INC.,
Petitioner,

v.

HUGHES TOOL COMPANY,
Respondent.

APPENDIX TO PETITION FOR A WRIT OF CERTIORARI TO THE UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT

Of Counsel
M. SCOTT NICKSON, JR.
EDWARD G. FIORITO
DRESSER INDUSTRIES, INC.
1600 Pacific Avenue
Dallas, Texas 75201

JOHN F. LYNCH
ARNOLD, WHITE & DURKEE
400 One Bering Park
750 Bering Drive
Houston, Texas 77057

ERWIN N. GRISWOLD
Counsel of Record
KATHRYN M. FENTON
SARAH W. PAYNE
JONES, DAY, REAVIS & POGUE
1450 G Street, N.W.
Washington, D.C. 20005-5701
(202) 879-3898
Counsel for Petitioner

WILSON - EPES PRINTING CO., INC. - 789-0096 - WASHINGTON, D.C. 20001

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APPENDIX A

APPENDIX A

UNITED STATES COURT OF APPEALS
FEDERAL CIRCUIT

Appeal Nos. 85-2471, 85-2502

HUGHES TOOL COMPANY,
Appellee, Cross-Appellant,

v.

DRESSER INDUSTRIES, INC.,
Appellant, Cross-Appellee.

April 13, 1987

Before FRIEDMAN, RICH, Circuit Judges, COWEN, BENNETT,* Senior Circuit Judges, and NIES, Circuit Judge.

RICH, Circuit Judge.

This appeal is from the final amended judgment of March 11, 1985, of the United States District Court for the Northern District of Texas, Mahon, Judge, holding Hughes Tool Company's (Hughes Tool) U.S. Patent No. 3,397,928 ('928 patent)[1] valid and infringed by Dresser

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* The Honorable Marion T. Bennett assumed senior status on March 1, 1986.

[1] Cases involving this patent have been decided by this court on two previous occasions. *See Smith International, Inc. v. Hughes Tool Co.*, 718 F.2d 1573, 219 USPQ 686 (Fed. Cir. 1983) (ordering

Industries, Inc. (Dresser), awarding damages in the amount of $132,096,430.92, and from orders denying various Dresser post-trial motions to reopen the record, amend the judgment, and for a new trial. We affirm in part, vacate in part, and remand.

I. *Background*

The '928 patent claims in suit are directed to combinations of elements in a rock bit used in drilling oil and gas wells. Those combinations involve the use of a packing or seal of the O-ring type in the enclosed journal bearings of the rock bit cutters, wherein the O-ring is compressed by not less than 10% and preferably 15% of the thickness of the O-ring prior to its assembly.

A. *Rock Bits*

The first rolling cutter rock bit was invented in 1909 by Howard Hughes, Sr. The modern rock bit, the product of technical improvements made over the last seventy-five years to Mr. Hughes' original, is a sophisticated piece of machinery costing up to several thousand dollars apiece. A rock bit, generally, is comprised of a supporting body structure or "head" to be threaded onto the lower end of a string of drill pipe, and carries three rotatable, generally conical cutters having either steel teeth or tungsten carbide insert ("TCI") cutting elements. These conical cutters turn on internal bearings and are mounted on three shafts or axles on the head.

In drilling wells using rock bits, the drill pipe with the rock bit attached is lowered, section by section, into the drill hole and rotated under the great weight of the string against the bottom. This causes the bit to work

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the District Court for the Central District of California to issue an injunction) and 759 F.2d 1572, 225 USPQ 889 (Fed. Cir. 1985) (an appeal challenging orders of the same court passing on various motions of Smith and Hughes). A third appeal in that case with respect to the damage award was argued Dec. 1, 1986.

against the rock formation, chipping or crushing the rock as the cones drag and roll upon the bottom of the hole. A drilling fluid, usually water or a thin mud, is pumped downward through the pipe, and emerges from nozzles in the bit, picking up cuttings loosened at the bottom of the hole. The cuttings are carried upward from under the bit outside the pipe to the surface.

Much of the time and expense of rotary drilling is spent in the process of "tripping"—removing a spent bit from the end of a drill pipe at the bottom of the hole and replacing it with a new one. When a rock bit fails, as it inevitably will, the drilling crew must raise the drill stem, uncouple and stack the ninety-foot pipe sections one at a time, substitute a new bit, then recouple and lower the pipe into the hole and resume drilling. In drilling wells of several thousand feet and more, the trip time required to change a bit may take up to ten or twelve hours, during which time no drilling gets done and injuries to the crew and other catastrophes such as blow-outs and well fires are most apt to occur.

The goal of rock bit engineers has thus been to increase the useful drilling life of the bit. There have been two primary approaches to solving that problem: improving the effectiveness and durability of the teeth or cutters, and prolonging the life of the bearings on which the cutters turn. Failure of either necessitates a "trip." This case relates to bearings.

B. *Bearings*

The '928 patent is directed to solving the bearing portion of the rock bit design problem. The '928 patent discloses a design providing a bearing capacity which could outlast the life of the cutters.

Historically, there have been two main classes of bearings involved in rock bit technology: "journal" or "friction" bearings and "anti-friction" bearings which contain roller and possibly also ball bearings. Journal bearings

are the simplest and sturdier form. The first rolling cutter rock bits dating from 1909 utilized journal bearings which were unsealed against grease loss and the intrusion of abrasive drilling fluid. The bearing was lubricated by a long lubricator sub-assembly from which grease flowed downward into the bearings and outward from the bottom of the bit. Various attempts were made during the early years to seal the journal bearings of Mr. Hughes' original design. While a sealed bearing would have prevented the drilling fluid from entering the bearing and retained the lubricating grease in the bearing, none of the early attempts to seal journal bearings succeeded.

Due to the perceived inability to seal them, journal bearings were abandoned in the early 1930's in favor of anti-friction roller bearings, which were better able to withstand the severe drilling environment without being sealed. In the original roller bearing bits, the drilling fluid was permitted to circulate through the roller bearings, a process known as "slush lubrication." The roller bearing bit soon became the standard in the industry.

C. *Seals*

There were many problems in designing a sealed bearing rock bit, because of the severe conditions in which such bits operate—the very limited space available in a rock bit, the extreme weight and high temperatures at the bottom of the drill hole, and the rapid and peculiar movements of the cutters and shafts of the bits when slightly worn. An effective seal would have to possess both the resiliency to follow the erratic movements of the cutters but also be able to maintain an effective seal against changes in relative hydraulic pressures of the grease and drilling fluid.

Although the first patents disclosing sealed bearings were issued as early as 1918, it was not until the late 1950's that the first successful sealed-bearing rock bits were developed. Those first commercially successful sealed

bearing rock bits utilized the then conventional roller bearings, an internal supply of grease, and the so-called "Belleville" seal, disclosed in Hughes Tool's Atkinson et al. U.S. Patent No. 3,075,781. The Belleville seal makes use of a saucer-shaped, annular, steel spring covered with rubber or plastic that surrounds the bearing shaft, providing continuous pressure against the opposed sealing surfaces of the head and cutter throughout the compound movements of the cutters during operation of the bit.

Although the Belleville-sealed bearing bits increased bit life dramatically, rock bit design engineers continued to work on improving bearing performance, hoping to design a bearing that would outlast the useful life of the cutters. Although synthetic rubber O-ring seals, which had developed rapidly in the World War II period, were known to be effective seals in other industrial applications, they were usually recommended for use only when the bearing surfaces to be sealed were free of abrasive substances and where movements such as wobbling between the parts to be sealed would be small.

O-rings had been used as seals in rock-bit bearings before the present invention. Neilson U.S. Patent No. 3,127,942, issued in April, 1964 (Neilson patent) discloses a roller-bearing bit having an O-ring seal. Both U.S. Patent No. 2,075,997, issued to Clarence Reed in 1935 (Reed patent) and U.S. Patent No. 2,814,461, issued in 1957 to William Green (Green patent) relate specifically to a packing ring in a journal bearing bit. Green discloses the placement of a squeezed "packing ring" or "sealing gasket" (neither shown as nor stated to be O-rings) on the bearing shaft and between the opposing head and cutter surfaces, while Reed shows a packing ring similarly positioned that "would be compressed when placed in position."

D. *The Squeeze*

Although Dresser, Smith International, and other competitors as well as Hughes Tool experimented with O-

ring seals in the 1950's and early 1960's, none of these efforts was successful. The first successful O-ring seal in a rock bit was developed at Hughes Tool by Edward M. Galle, patentee of the '928 patent. Although Galle was not the first to make use of an O-ring seal in a rock bit, the primary distinction between the Galle invention and the work of his predecessors was the amount of cross-sectional "interference" or "squeeze" imparted to the O-ring in Galle's rock bit journal bearing design.

Although it was understood that relatively high-speed *rotary* operations, such as those involved in rock bit drilling, called for a small amount of squeeze, the '928 patent teaches a squeeze of "not less than substantially ten percent" and preferably not less than fifteen percent of the cross-sectional thickness of the O-ring in its relaxed condition. This is considerably higher than the amount of squeeze recommended by manufacturers of O-rings. Such amounts of squeeze were believed to increase friction and overheat the O-rings, thus decreasing their life span. The '928 patent disclosed that the heat generated by such large interferences apparently "dissipates in the drilling fluid that turbulently flows around the drill bit."

E. *Hughes Tool's New Rock Bits*

Hughes Tool introduced new rock bits embodying the seal invention of the '928 patent with journal bearings in 1969. The new bits were very successful, demonstrating a capacity to endure for extremely long runs, on the order of 100 hours or more, which was double or triple the performance of the old slush-lubricated rollers bits. The new sealed journal bearing bits were particularly successful because they unlocked the full potential of the TCI cutting structures, which typically had outlasted the bearings.

Hughes Tool's competitors reacted immediately to the introduction of the new bits, commencing research projects to develop competitive bits. Although the engineers at

Hughes Tool's main competitors, Dresser and Smith International, Inc., were skeptical of the teachings of the '928 patent and particularly of the usefulness of O-rings in a bearing seal, both companies ultimately decided to copy the O-ring seal of the '928 patent and began selling rock bits that included Hughes Tool's patented O-ring seal. Over $3.5 billion worth of the new sealed journal bearing rock bits were ultimately sold by Hughes Tool and its competitors. Dresser's total sales of such rock bits in the years 1973 through 1982 amounted to $343,354,994.00.

II. *The Present Action*

Hughes Tool originally filed this action against Dresser in 1976, alleging infringement of its '928 patent as well as U.S. Patent Nos. 3,476,195 ('195 patent) and reissue patent Re. 28,625. The reissue patent was dismissed from the suit voluntarily before trial in a consent judgment of invalidity.

On July 11, 1980, the district court granted Dresser's motion for summary judgment, dismissing this action on collateral estoppel grounds, after both the '928 and the '195 patents were held invalid for obviousness by the United States District Court for the Middle District of California in an earlier-filed suit between Hughes Tool and Smith International. On appeal, the Court of Appeals for the Ninth Circuit reversed the holding of invalidity of both the '928 and '195 patents, holding that Smith had not sustained its burden of showing invalidity. *Smith International, Inc. v. Hughes Tool Co.*, 664 F.2d 1373, 215 USPQ 592 (9th Cir.), *cert. denied*, 456 U.S. 976, 102 S.Ct. 2242, 72 L.Ed.2d 851 (1982).

The present case was thereupon reactivated in May, 1982. Following a bench trial in February, 1983, the district court entered a Memorandum Opinion and Order on February 6, 1984, finding the '928 patent valid and infringed, but finding the '195 patent invalid.

Dresser filed post-trial motions under Fed.R.Civ.P. 59, asking for a new trial on the grounds of newly discovered evidence regarding the validity of the '928 patent as well as the size of the damage award. Those motions were denied by the district court.

Dresser has appealed the district court's holding of validity of the '928 patent and the amount of damages awarded to Hughes Tool for the infringement. Dresser also appeals the court's denial of its post-trial motions. Hughes Tool does not appeal the district court's holding that the '195 patent is invalid, but cross appeals on two issues relating to the sufficiency of the damage award for the infringement of the '928 patent.

III. *The Decision Below*

The lower court opinion being unreported, we will summarize briefly its major findings and conclusions with the general preliminary comment that the court was thorough, fair, and comprehensive in its analysis. It wrote 42 pages exclusive of formal findings and conclusions which occupy an additional 22 pages.

A. *Validity*

The district court, in its extensive memorandum opinion, began its analysis by noting that the '928 patent "involves an O-ring or packing ring positioned in a groove, thus forming a seal for a rock bit." The court noted that claim 1 calls for the O-ring to be "compressed by not less than substantially ten percent of its thickness prior to assembly."

The court then turned to an examination of the scope and content of the prior art and a comparison of the differences between the prior art and the claims at issue, finding that the prior art revealed all of the elements of the '928 patent except the requirement of a squeeze of "not less than substantially 10%." Although Dresser submited evidence of articles and catalogs showing that

squeezes of more than 10% were commonly used for slow rotary speed seals, the court found that rock bit bearings are run under high speed and high temperature rotary conditions. The court also noted that "[w]ithout exception, the catalogs recommended higher squeezes for slow rotary speeds and lower squeezes for fast rotary speeds." The court thus concluded that rock bit engineers in the 1960's would have consulted the charts for fast rotary speeds and would have concluded that squeezes well below 10% were proper for O-ring bearing seals in rock bits. The court also noted in conclusion that the prior art would probably have discouraged rock bit engineers from considering the use of O-rings as bearing seals because of the abrasive conditions and the heat, pressure, and friction encountered at the bottom of the drill hole. The court thus found that the inventor, Galle, proceeded "contrary to the accepted wisdom of the art" by using an O-ring seal in a rock bit and by requiring a minimum of a 10% squeeze.

With respect to the criticality of the minimum 10% squeeze, the district court found that the successful results of the greater squeeze were unexpected and "contrary to the thinking of rock bit engineers in the 1960's." Moreover, the criticality was substantiated by the fact that the minimum 10% squeeze was the one factor that both Hughes and all of its competitors found to be essential to a longer-life bit. The court concluded that there was "ample evidence showing the criticality" of the minimum 10% squeeze.

The court also discussed evidence of the skepticism of the experts at both Smith International and Dresser, the overwhelming commercial success of Hughes Tool's new rock bits, and the fact that both Dresser and Smith International chose to copy the patented feature of the new bits. The court then concluded that the evidence "clearly establishe[d] that the use of an O-ring with a minimum of a 10% squeeze in a rock bit would not have been obvious to a person having ordinary skill in the art. . . ."

B. *Damages*

Although Hughes Tool sought damages based on its lost profits with respect to the TCI journal bearing bits Dresser sold to customers within the United States, the court concluded that Hughes Tool "failed to demonstrate with 'reasonable probability' an approximation of the profits it would have made on the infringing Dresser sales." The court then set out to determine, "under the 'willing buyer—willing seller' rule, what a reasonable royalty" would have been.

In assessing the evidence on the damages issue, the district court found that customer demand for the patented rock bits was strong and that no acceptable non-infringing alternative existed. However, the court also found that Hughes Tool failed to demonstrate the manufacturing and marketing ability to meet the demand for at least part of the period of Dresser's infringement.

Turning specifically to the commercial situation as it existed in 1973, the district court noted that Hughes Tool was experiencing a rising demand for its patented journal bearing bits and that Hughes Tool believed that those bits were more profitable than its sales of certain other tools. Although Hughes Tool had a company policy of not licensing its patented inventions to major competitors, the court did note evidence of forty-five prior licenses and offers of licenses under other patents owned by Hughes Tool at royalty rates of six percent or less. The court did not give much weight to those prior royalty rates, however, because those licenses were for widely diverse products. Similarly, the court acknowledged the existence of one license at four percent to a non-competitor, Gault, and specifically held that it would not consider a fifteen percent license agreement made in 1983 in settlement of litigation with Hughes Tool's competitor, Rock Bit Industries. The court ultimately concluded that Hughes Tool showed no desire to license direct competitors under the '928 patent.

The court also found that Dresser was concerned about a potential loss of fifty to sixty percent of its rock bit market to Hughes Tool; that when Dresser considered beginning to manufacture the patented journal bearing bits itself in 1973, it projected total profits of 60% on sales of the new bits; and that its total profits on all sales the year before had been 7.2%. The district court also noted that Hughes Tool asserted profits of 49-54% on sales of the patented journal bearing insert bits.

The district court found, however, that Hughes Tool did not realize that the demand for rock bits other than sealed journal bearing bits would drop as sharply as it did. In addition, Hughes Tool was aware that its competitors were working diligently to produce competitive rock bits. Finally, the district court found that the '928 patent did not give the new rock bits their essential market value, but rather that the patented O-ring seal was only one of numerous parts that contributed to the overall value of the rock bit.

Although Hughes Tool's expert at trial asserted that 52.8% was a reasonable royalty for both the patents in suit, that assertion was based on the assumption that the patented combination with the O-ring seal was responsible for most of the value of the bit. The district court disagreed, stating that the '928 patent contributed only part of the total value of the bit, and concluded that 25% of the gross sales price would have been a reasonable royalty had the parties negotiated for a license in 1973.

The district court went on to find that a ten percent interest rate was appropriate for awarding prejudgment interest. The court declined to increase the damages, finding that Dresser did not willfully infringe the '928 patent. Although Dresser "deliberately copied the ideas and designs in the '928 patent," the court found that Dresser did so only after a reasonable investigation into the scope of the patent and a good faith belief that the patent was invalid.

In its amended judgment of March 11, 1985, the district court awarded damages in the amount of $132,096,430.92 to Hughes Tool. That amount included prejudgment interest of $29,439,158.91.

The court did not award prejudgment interest for the period between November 30, 1979 and February 22, 1982, when the '928 patent "was considered invalid and unenforceable by the California federal court." That was the period between the district court holding of invalidity in the *Smith* suit and its reversal by the Ninth Circuit Court of Appeals.

The court held further hearings on February 15, 1985 and March 1, 1985, on Dresser's motions to reopen the record, to alter or amend the judgment, and for a new trial. After stating that it did not find the allegedly newly discovered evidence warranted reopening of the case or a reduction in the damages award, the court denied Dresser's motions in an order dated May 2, 1985.

On May 31, 1985, Dresser appealed the district court's judgment with respect to the validity of the '928 patent and the amount of damages, as well as the district court's denial of its post-trial motions. Hughes Tool filed its cross-appeal on June 13, 1985, seeking review of the district court's failure to award increased damages as well as its failure to award prejudgment interest for the period the '928 patent had temporarily been under the cloud of a district court holding of invalidity.

IV. *Opinion*

A. *Validity*

The issue here is whether the district court erred in concluding that Dresser did not carry its burden of proving that the invention claimed in the '928 patent, as a whole, would have been obvious to one of ordinary skill in the art at the time the invention was made.

Under 35 U.S.C. § 282 the '928 patent is presumed valid. That presumption places the burden of establishing invalidity on the attacker, Dresser. It is for the district court to determine whether the attacker has carried the burden. *American Hoist & Derrick Co. v. Sowa & Sons, Inc.*, 725 F.2d 1350, 1360, 220 USPQ 763, 771 (Fed.Cir.), *cert. denied*, 469 U.S. 821, 105 S.Ct. 95, 83 L.Ed.2d 41 (1984). The attacker must provide clear and convincing evidence of the facts leading to the conclusion of invalidity of the claims at issue in order to carry that burden. *Lindemann Maschinenfabrik GMBH v. American Hoist & Derrick Co.*, 730 F.2d 1452, 1459, 221 USPQ 481, 486 (Fed.Cir.1984).

After considering all of the evidence before it, including prior art before the Patent and Trademark Office (PTO) during prosecution as well as evidence that was not before the PTO, the district court concluded that the evidence did not support Dresser's assertion that the prior art would have suggested a minimum 10% squeeze of O-rings used to seal rock bit bearings. Dresser's evidence included catalogs and articles which suggested that a squeeze of greater than 10% would be appropriate for low speed rotary applications. However, the evidence before the court also indicated that the sliding velocity on the surface seal of a rock bit bearing is as high as 540 feet per minute, a concededly "high" rotary speed. The district court thus properly found that rock bits are sometimes run at high speeds and that rock bit engineers in the 1960's would have designed the bits for high speed rotary operations, thus leading them to conclude that squeezes well below 10% would have been appropriate.

Dresser also challenges the district court's finding that a squeeze of not less than 10% is "critical," arguing that the burden should have been on Hughes Tool to establish the criticality of that claim limitation. Although the district court expressed "concern" over the evidence of criticality before the PTO, the presumption of validity placed the burden of establishing non-criticality on Dresser.

Dresser has not pointed to any evidence tending to show that the minimum of 10% squeeze was *not* critical. We are not persuaded that the district court was clearly erroneous in concluding that Dresser had not carried its burden of persuasion on the criticality issue. If it was not critical to success, why was it copied?

Finally, Dresser argues that the district court erred by considering objective indicia of nonobviousness (the so-called "secondary considerations"), namely, evidence of skepticism of experts, long-felt need, commercial success, and copying. Dresser conceded that rock bits embodying the features claimed in the '928 patent attained enormous commercial success and satisfied a long-felt need. Dresser also conceded that while its engineers were initially skeptical, it eventually copied the patented features of Hughes Tool's new rock bits, including the amount of squeeze imparted to the O-ring seal. The district court noted that, despite Dresser's assertions that other aspects of Hughes Tool's new rock bits were responsible for Hughes Tool's commercial success, the one feature that Hughes Tool and all of its competitors continued to use was the minimum 10% squeeze called for in the claims in suit of the '928 patent. Such continuous use of the patented feature while other features were not copied gives rise to an inference that there is a nexus between the patented feature and the commercial success. We are not persuaded that the district court erred in concluding that there was such a nexus in this case.

We conclude, on the record before us, that the district court properly held that Dresser failed to carry its burden of proving that the '928 patent is invalid for obviousness of the claimed invention.

Dresser has not denied its infringement of the '928 patent. Thus the only issues remaining on appeal and cross-appeal are those pertaining to the amount of the damage award.

B. *Damages*

The district court's award of damages to Hughes calculated as a royalty of 25% of the dollar amount of Dresser's total sales of certain infringing bits is based on a finding of fact with respect to Dresser's projected profits which Dresser asserts is clearly erroneous.[2] The basic predicate for the district court's 25% royalty determination is that Dresser projected "total profits of 60% as a percent of sales (PX 82, 93, Response to Request for Admission 11)." That 60% "profit" figure was then contrasted with Dresser's 1972 actual profits of 7.2% for all of its sales. (PX 82, Response to Request for Admission 16.) The 60% profit projection is referenced repeatedly in the court's analysis and is clearly critical to its damage award:

> ". . . the projection of 60% profit in the present case, admitted by Dresser"
>
> "Hughes's 49% and 54% royalty requests would be 81.6% and 90% of Dresser's projected 60% profits in this case."
>
> "15% profit" in other Hughes litigation is "considerably lower profit than those projected in the present case."
>
> "the parties in 1973 projecting 49% [Hughes] to 60% [Dresser] profits."
>
> "Dresser projected 60% profits on the sale of bits with the '928 seal."

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[2] A 5% royalty was awarded on infringing steel tooth bits; 25% on the premium insert journal bits. The 5% figure is not challenged on appeal. The difference in these royalties apparently resulted from the district court's assessment that 5% and 25%, respectively, were the contributions of the invention to "the value of the bits." There is, however, no direct evidence on this point, or evidence from which a reasonable inference of 5% and 25% respectively might be drawn.

"Hughes suggests it realized profits of 49% and 54% on its '928 bits sold in the United States and abroad."

"This figure [25% of sales price] would still have allowed Dresser to realize a large profit on its sales of the bits."

"Of these various considerations [relevant to setting a reasonable royalty] the expected profit from making and selling the patented invention is the primary consideration."

Before this court Hughes Tool argues: "The magnitude of this 'large profit' of 60% less the royalty award of 25%, left Dresser a 35% profit from sales—as contrasted with its usual profit of 7.2% of sales on all of its products." Hughes's simple arithmetic, however, is a gross distortion of reality.

The evidence of Dresser's projected profitability does not show, as the trial court found and Hughes asserts here, that, in 1973, Dresser was projecting 60% profit on the proposed new product line. Rather, Dresser's projection was a 60% return on the additional investment required to make the bits. Thus, the 60% projection of such return cannot be compared meaningfully with the 7.2% *actual* profits of 1972.

The evidence on this point from PX 82 and PX 93 on which the district court relied for its finding is set forth below in pertinent part. In Requests for Admissions propounded to Dresser (PX 82) the following pertinent requests were made and answered:

REQUEST NO. 11 [by Hughes]

During the year 1973, defendant, Dresser Industries, anticipated that its incremental future sales of Insert Rock Bits with Journal Bearings would provide defendant with profits, on an earnings be-

fore tax basis, of not less than 60% of dollar sales of such Rock Bits.

RESPONSE TO REQUEST NO. 11 [by Dresser]

Denied. During the year 1973, *for the purposes of capital appropriations only*, personnel of Defendant at one time forecast that its incremental future sales ascribable to that particular appropriation request of insert Rock Bits with Journal Bearings would provide Defendant with profits, on an earnings before tax basis, of not less than 60% of dollar sales of such Rock Bits. [Emphasis ours.]

REQUEST NO. 16 [by Hughes]

During the fiscal years 1972 through 1981, defendant, Dresser Industries, was making profits, on a before tax basis, as a percentage of net dollar sales of all of its products and services as set forth below:

YEAR	PROFIT AS % OF NET DOLLAR SALES	NET DOLLAR SALES (MILLIONS)
1972	7.2	906.2
1973	7.1	1,025.2
1974	8.2	1,398.0
1975	11.2	2,011.6
1976	12.2	2,232.2
1977	13.2	2,538.8
1978	12.4	3,054.0
1979	11.8	3,457.4
1980	11.2	4,016.3
1981	11.5	4,614.5

RESPONSE TO REQUEST NO. 16 [by Dresser]

Admitted.

The documentary evidence (PX 93) which supports the answer to Interrogatory 11 is a 1973 internal Dresser report entitled "CAPITAL REQUIREMENTS FOR

COST REDUCTION & EXPANSION OF OILFIELD & MINING PRODUCTS." Page 1 of this document follows:

PROJECT SUMMARY

Approval is requested for an investment of $4.6MM in new equipment for our Division's rock bit manufacturing plants. The projected return on investment is 60.1%

This investment is required for two distinct reasons:

—*Expansion*

Equipment investment $2.8MM—R.O.I. 67.1%

To expand productive capability to meet current and projected Marketing demand for sealed bearing bits, blasthole bits, and drilling tool cutters.

—*Quality and Cost*

Equipment investment $1.8MM—R.O.I. 27.4%

To replace existing old equipment with modern, high precision machine tools in order to meet the exacting specifications of today's high-technology bits and thereby establish a uniform quality level of our products.

To reduce variable production cost, curtail work-in-process inventories and lead-time, and retain and enhance our position as low cost producer in the industry.

The project is split into three separate appropriation requests, each one of which is an integrated package:

AR 73-124A—Illinois Avenue Expansion

AR 73-124B—Manchester Expansion

AR 73-124C—Illinois Avenue Cost Reduction

The machine tools requested in each individual A.R. are complementary in the production process. Segre-

gation of individual tools out of an A.R. will seriously impair the meeting of the objectives set forth.

New investment in buildings or land is *not* required.

The testimony of Dresser's controller, Mr. Munnerlyn, and Hughes Tool's Chief Accounting Officer, Mr. Willis, is consistent with the above evidence that the expected profit on incremental sales would yield a 60% return on incremental investment. There is no evidence to the contrary.[3]

Thus, this case closely parallels *Georgia-Pacific Corp. v. U.S. Plywood-Champion Papers, Inc.*, 446 F.2d 295, 170 USPQ 369 (2d Cir.), *cert. denied*, 404 U.S. 870, 92 S.Ct. 105, 30 L.Ed.2d 114 (1971). The question in *Georgia Pacific* was the reasonableness of a royalty of $50 per thousand square feet of certain plywood sales. There, the district court (as did the district court here) accepted that a reasonable royalty must be fixed so as to leave the infringer a reasonable profit. *Georgia Pacific Corp. v. United States Plywood Corp.*, 318 F.Supp. 1116, 1122, 166 USPQ 235, 239 (S.D.N.Y.1970). To calculate the royalty, the *Georgia Pacific* trial court erroneously used a figure of $159.41, which represented Georgia Pacific's average "realization" on plywood sales [possibly margin], rather than a figure of $50.00, which represented Georgia Pacific's expected profit on such sales. Thus, the award of a $50.00 royalty, which would leave no profit, was set aside on appeal as excessive. 446 F.2d at 299, 170 USPQ at 372.

The royalty of 25% set in this case, being based on a clearly erroneous finding of projected profits of 60% as

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[3] The dissent says the majority apparently views PX 93 and Interrogatory 11 as inconsistent. The two exhibits are consistent and support each other. The dissent simply misreads the answer to Interrogatory 11, ignoring the significant words "for purposes of capital appropriations only." The dissent also omits the part of Mr. Munnerlyn's testimony which explains that he was justifying an appropriation request and that the projection was "way overstated" as an actual projected profit figure.

a percent of sales, is *ipso facto* arbitrary and must be set aside.

C. *Prejudgment Interest*

An award of prejudgment interest to a patent owner for the period during which his patent was declared invalid is appropriate if, after exercising its discretion, the district court decides that such an award is necessary to put the patent owner in as good a position as he would have been in had the infringer entered into a reasonable royalty agreement when the infringement began. The district court here decided not to award prejudgment interest for the time during which the '928 patent was considered invalid and unenforceable. The court's decision must be reviewed for abuse of discretion. But to the extent that decision was based on the misunderstanding that prejudgment interest can never be awarded in such a circumstance, it is contrary to law and should be reconsidered on remand. *See General Motors Corp. v. Devex Corp.*, 461 U.S. 648, 657, 103 S.Ct. 2058, 2063, 76 L.Ed.2d 211, 217 USPQ 1185, 1188 (1983).

Lastly, we affirm the trial court's May 2, 1985, denial of Dresser's post-trial motions.

Conclusions

The judgment of the district court with respect to validity is *affirmed*. The judgment on damages is *vacated* and the case is *remanded* for a redetermination of damages based on a reasonable royalty computed in accordance with this opinion and a reconsideration of the amount of prejudgment interest.

Dresser's Post-Hearing Motion

On November 24, 1986, ten months after this case was heard, Dresser filed a Motion to Remand, to Vacate, or to Reopen the Record, or Obtain Relief from Judgment because of a document it became aware of contained in an appendix in a case, *Smith International, Inc. v. Hughes*

Tool Co., Nos. 86-1139, 86-1125, *see* note 1, supra, which was argued in this court in December of 1986. Dresser argues that this newly discovered evidence has a material effect on the validity of the '928 patent because it indicates that Hughes Tool was still searching, in 1974, for a bit that would operate efficiently at high RPM. Dresser asserts that this document was withheld. Hughes Tool retorts that it twice provided the document but that Dresser never requested that it be copied, and further that the document does not affect the outcome of this case. Given the factual disputes bound up with this motion, we cannot, as an appellate tribunal, pass on its merits and therefore deny Dresser's motion.

AFFIRMED IN PART, VACATED IN PART, AND REMANDED.

FRIEDMAN, Circuit Judge (with whom BENNETT, Senior Circuit Judge, joins), dissenting in part.

I disagree with the court's holding that the district court's finding that Dresser projected a profit of 60 percent of its sales prices of certain bits is clearly erroneous. I also would hold that the district court improperly denied prejudgment interest for the period during which the '928 patent was considered invalid and unenforceable following the district court's decision so holding, which the Court of Appeals for the Ninth Circuit reversed more than two years later. In all other respects I agree with and join the court's opinion.

I

In setting aside the finding that Dresser projected a profit of 60 percent of sales, the court refers to four items of evidence. The strongest is Hughes' request No. 11 for admission and Dresser's response:

REQUEST NO. 11

During the year 1973, defendant, Dresser Industries, anticipated that its incremental future sales

> of Insert Rock Bits with Journal Bearings would provide defendant with profits, on an earnings before tax basis, of not less than 60% of dollar sales of such Rock Bits.
>
> *RESPONSE TO REQUEST NO. 11*
>
> Denied. During the year 1973, for the purposes of capital appropriations only, personnel of Defendant at one time forecast that its incremental future sales ascribable to that particular appropriation request of insert Rock Bits with Journal Bearings would provide Defendant with profits, on an earnings before tax basis, of not less than 60% of dollar sales of such Rock Bits.

Although Dresser denied this request, the reason for the denial was not disagreement with the figure of "not less than 60% of dollar sales of such rock bits," but disagreement over whether during 1973 Dresser had "anticipated" such earnings, as the request stated. Dresser denied the request and set forth its position that dur- 1973 its personnel, "for purposes of capital appropriations only, . . . at one time forecast that its incremental future sales ascribable to that particular appropriation request" would be "60% of dollar sales."

In other words, Dresser's disagreement was not with whether the percentage of dollar sales was 60 percent, but whether this profit was "anticipated" or merely "forecast" by some of Dresser's personnel for the purpose of making capital appropriations. Dresser's response adopted Hughes' language that the earnings forecast by Dresser personnel on sales of "Insert Rock Bits with Journal Bearings [was] . . . of not less than 60% of dollar sales of such Rock Bits."

The court also quotes from plaintiff's exhibit 93, a Dresser 1973 internal document which projected a 60.1 percent "return on investment" on recommended increases in plant and equipment to be used in manufactur-

ing bits. The court apparently views PX 93 as inconsistent with the response to request No. 11, and therefore may have assumed that when Dresser stated in that response that it forecast earnings of "60% of dollar sales," it meant 60 percent "on" the additional "investment."

Even if this were the only evidence in the record, the court would not be justified in reversing the finding as clearly erroneous. Despite plaintiff's exhibit 93, Dresser's unequivocal admission that it forecast earnings of not less than 60 percent of "dollar sales," which it made in a carefully considered response to the request, justified the district court's acceptance of that figure. *See* Fed. R.Civ.P. 36(b). Furthermore, the unambiguous language of Dresser's response to request No. 11 is not the only evidence in the record that supports the 60 percent of dollar sales figure. In fact, testimony showed that Dresser's response in terms of a percentage of "dollar sales," rather than a percentage of such items as "capital appropriations" or "additional investment" was correct, not erroneous.

In its operations, one division of Dresser, "P & M Manufacturing" (P & M), manufactured the insert journal bearing bits, and another division, "Security," sold them. After P & M manufactured the bits, it "sold" them to Security at a fictitious price that included a "profit" for P & M based on the "sale" price less manufacturing costs (including materials and labor) and overhead allocation. Security sold the bits to customers, and a "profit" was attributed to Security based on the selling price less Security's purchase "cost" (from P & M) and Security's own selling costs and overhead allocation. The overall profit to Dresser was the sum of the profits thus allocated to P & M and Security.

The 1973 internal appropriations request report (PX 93), upon which the majority relies, does state that 60.1 percent is the projected return on the investment of $4.6 million for new equipment for the rock bit manufactur-

ing plants. However, further examination shows that the internal report covers capital appropriations involving the manufacture and sale of seven different bits, only one of which was the infringing insert friction bit at issue here. In discussing the report with respect to the sales projections for only the insert friction bit, Mr. Munnerlyn, Dresser's comptroller, stated that P & M was projected as manufacturing and selling 1,750 insert friction bits to Security for $908,000, on which P & M anticipated a profit of $89,000 (9.8 percent). Mr. Munnerlyn also testified that Security anticipated sales of the same bits for $2,713,000, of which $1,559,000 was expected profit. The following colloquy then occurred:

> Q. And so, the total expected profit from the manufacture and sale by Dresser of insert journal bearing bits, in 1973, was 60 cents of each sales dollar, wasn't it?
>
> A. If you add those two together, that's what you would get.
>
> Q. Wasn't that the expected profit?
>
> A. Yes.

Thus, the two divisions of Dresser projected a combined profit of $1,648,000 on annual sales of $2,713,000 for an anticipated profit of 60.7 percent relative to annual dollar sales, which is the figure admitted by Dresser in response to Request No. 11. (These estimated profits apparently did not include anything for "capital fee," but the appropriations report did take into account some allocations for "capacity costs.")

As the Supreme Court recently pointed out, the "clearly erroneous" standard in Federal Rule of Civil Procedure 52(a)

> does not entitle a reviewing court to reverse the finding of the trier of fact simply because it is convinced that it would have decided the case differently. The reviewing court oversteps the bounds of

its duty under Rule 52(a) if it undertakes to duplicate the role of the lower court.

Anderson v. City of Bessemer City, 470 U.S. 564, 573, 105 S.Ct. 1504, 1511, 84 L.Ed.2d 518 (1985). The district court's finding in this case cannot be clearly erroneous.

II

Although the district court noted in this case that "prejudgment interest should be awarded under 35 U.S.C. § 284 unless there is some justification for withholding such an award," the only explanation the court gave for its denial of prejudgment interest for the period from November 30, 1979 to February 22, 1982, was that the '928 patent "was considered invalid and unenforceable by the California federal court" (amended judgment, paragraph 5). The majority holds that this ruling was within the district court's discretion, "[b]ut to the extent that decision was based on the misunderstanding that prejudgment interest can never be awarded in such a circumstance, it is contrary to law and should be reconsidered on remand. *See General Motors Corp. v. Devex Corp.*, 461 U.S. 648, 657, 103 S.Ct. 2058, 2063, 76 L.Ed. 2d 211, 217 USPQ 1185, 1188 (1983)." For the following reasons, I cannot agree.

In the *General Motors* case, the Supreme Court stated that "[b]ecause we hold that prejudgment interest should ordinarily be awarded absent some justification for withholding such an award, a decision to award prejudgment interest will only be set aside if it constitutes an abuse of discretion." 461 U.S. at 657, 103 S.Ct. at 2063, 217 USPQ at 1189. I disagree with the court's ruling that a decision not to award prejudgment interest is reviewable only for an abuse of discretion. Where prejudgment interest is denied, a reviewing court must first determine if the justification the district court gave is sufficient as a matter of law to support the limitation or elimination of such interest, and then must further

review the factual findings supporting the justification to determine if they are clearly erroneous. *See Bio-Rad Laboratories, Inc. v. Nicolet Instrument Corp.*, 807 F.2d 964, 968, 1 USPQ2d 1191, 1194 (Fed.Cir.1986). In my view, the district court in the present case was not warranted in denying prejudgment interest for the interim period that the parent was considered invalid.

Recently, this court in *Bio-Rad* reiterated its view "that a district court's justification for limiting prejudgment interest 'must have some relationship to the award of prejudgment interest.'" *Id.* at 967, 1 USPQ2d at 1193 (citing *Radio Steel & Mfg. Co. v. MTD Prod.*, 788 F.2d 1554, 1557-58, 229 USPQ 431, 434 (Fed.Cir.1986)). The purpose of awarding prejudgment interest is "to afford the plaintiff full compensation for the infringement." *General Motors*, 461 U.S. at 654, 103 S.Ct. at 2061, 217 USPQ at 1188. As the Supreme Court explained:

> In the typical case an award of prejudgment interest is necessary to ensure that the patent owner is placed in as good a position as he would have been in had the infringer entered into a reasonable royalty agreement. An award of interest from the time that the royalty payments would have been received merely serves to make the patent owner whole, since his damages consist not only of the value of the royalty payments but also of the forgone use of the money between the time of infringement and the date of the judgment.

Id. at 655-56, 103 S.Ct. at 2062-63, 217 USPQ at 1188 (footnote omitted).

The district court awarded Hughes damages for the entire period of Dresser's infringement, including the period during which the '928 patent "was considered invalid and unenforceable by the California federal court." Since the purpose of prejudgment interest is to compen-

sate the patentee for the "forgone use of the money between the time of infringement and the date of the judgment" that it would have received had the defendant entered into a royalty agreement instead of infringing, I think the prejudgment interest should cover the entire period of infringement, as the damages do. The fact that during part of the time the patent was considered invalid does not constitute a sufficient "justification for withholding such an award" which, under the dictum in *General Motors*, may make it "appropriate not to award prejudgment interest." *Id.*

Accordingly, I would reverse the district court's denial of prejudgment interest for the period from November 30, 1979, to February 22, 1982. Since the district court has already exercised its discretion in setting the rate of prejudgment interest and the method of compounding, *see Bio-Rad*, 807 F.2d at 869, 1 USPQ2d at 1194-95 (and cases cited therein), a remand on the prejudgment interest is not necessary.

APPENDIX B

APPENDIX B

IN THE UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF TEXAS
FORT WORTH DIVISION

Civil Action No. 4-76-53-E

HUGHES TOOL COMPANY

vs.

DRESSER INDUSTRIES, INC.

[Filed Feb. 6, 1984]

MEMORANDUM OPINION AND ORDER

Plaintiff Hughes Tool Company (hereinafter "Hughes") brought this action pursuant to 35 U.S.C. § 281 and 28 U.S.C. § 1338(a) alleging that Defendant Dresser Industries, Inc. (hereinafter "Dresser") infringed United States patents owned by Hughes. Dresser denied infringement, challenging the validity and enforceability of those patents. Dresser also asserted a counterclaim seeking a declaratory judgment that the patents have not been infringed and are invalid and unenforceable.

Trial was to the Court without a jury. Having heard and considered the testimony, evidence, oral arguments, supporting briefs, and applicable law, the Court now enters its opinion and judgment, which will address: (1) Procedural Background, (2) Factual Background, (3) Applicable Law, (4) The '928 Patent, (5) The '195

Patent, (6) Findings of Fact, and (7) Conclusions of Law.

I. *Procedural Background*

This action was filed in 1976 for infringement of United States Patent No. 3,397,928 (hereinafter the '928 patent) and 3,476,195 (hereinafter the '195 patent).[1] Plaintiff Hughes is the owner of these two patents, both of which involve inventions in the field of "rock bits," i.e., earth-boring tools used in rotary drilling of oil and gas wells. Prior to the commencement of this action, Hughes filed a suit in the United States District Court for the Central District of California, against Smith International, Inc., regarding the same patents which are involved in this case. There the trial court found the '928 patent invalid and entered a declaratory judgment of invalidity on November 30, 1979.

On July 11, 1980 this Court granted Dresser's motion for summary judgment, and dismissed the patent action, based on the November 30, 1979 judgment in California. However, on January 7, 1982, the Ninth Circuit Court of Appeals reversed the California trial court's decision and declared that Smith had failed to prove invalidity. In light of that reversal, this cause was reinstated on May 6, 1982 and proceeded to a trial on the merits.

II. *Factual Background*

The first rolling cutter rock bit was introduced in 1909, and since that time rock bit engineers have continuously worked toward the goal of increasing the drilling life of the bit. The circumstances surrounding rotary drilling which mandate such a goal may be described

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[1] The infringement of a third patent, United States Letters Reissue Patent No.: Re. 28,625, was also alleged in Hughes' Complaint, but that patent was later the subject of a consent judgment holding it invalid, and thus that patent was not at issue in the trial of this case. *Smith International, Inc. v. Hughes Tool Co.*, CA No. 72-1231—MML, M.D. California.

as follows: A rock bit is comprised of a supporting body structure and three rotatable cones with teeth or cutting elements on them. The cutters turn on three shafts or axles, with bearings located in the interior of each cone. When the rock bit is threaded onto the lower end of a drill pipe or string, the pipe is then lowered, section by section, into the hole and rotated, causing the bit to work against the formation at the bottom of the hole. When either the cutting elements or the bearings fail, this necessitates a "trip" in which the rock bit is raised, section by section, from the hole, replaced with a new one, and lowered, once again, section by section, into the hole.

A medium-capacity on-shore rig may cost in excess of five million dollars. Additionally, the costs of maintaining drilling rigs may run from $250 to $300 per hour (land rigs) to $2,000 per hour (off-shore rigs). These costs continue to run regardless of whether the rig is actually drilling or not. The economic benefits to be derived from extending bit life, and thus requiring fewer "trips" per mile of drilling, are significant. In addition, the "trips" are considered hazardous to the crew, with blow-outs and well fires most likely to occur during the changing of a bit. In conclusion, it is apparent that time, money, and lives may be saved through a rock bit engineer's success in extending the life of a rock bit.

III. *Applicable Law*

This Court must begin with the proposition that a lawfully issued patent is presumed to be valid.

35 U.S.C. § 282 states:

> A patent shall be presumed valid. Each claim of a patent (whether in independent, dependent, or multiple dependent form) shall be presumed valid independently of the validity of other claims; dependent or multiple dependent claims shall be presumed valid even though dependent upon an invalid claim. The

> burden of establishing invalidity of a patent or any claim thereof shall rest on the party asserting such invalidity.

The quantum of proof necessary to rebut the presumption of patent validity has been held to be greater than a mere preponderance of the evidence. "One who seeks to rebut the presumption bears a heavy burden." *Hobbs v. United States*, 451 F.2d 849, 856 (5th Cir. 1971); *Harrington Manufacturing Co., Inc. v. White*, 475 F. 2d 788 (5th Cir. 1973).

Additionally, Hughes suggests that the presumption of validity is strengthened by the fact that the most pertinent prior art was considered by the Patent Office Examiner before he allowed the patents. Dresser disagrees, stating that pertinent prior art was not before the patent examiner, asserting that the "presumption of patent validity is weakened and may be overcome where the evidence discloses that the examiner did not have the best prior art before him during the prosecution of the application." *Ingersoll-Rand Company v. Brunner & Lay, Inc.*, 474 F.2d 491 (5th Cir. 1973); *Beckman Instruments, Inc. v. Chemtronics, Inc.*, 439 F.2d 1369 (5th Cir.) *cert. denied* 400 U.S. 956 (1970).

The United States Court of Appeals for the Federal Circuit has held that failure of the Patent Office to consider "merely 'pertinent'" prior art does not affect the presumption of validity. However, "[t]he burden of proving invalidity may of course be facilitated by prior art that is *more pertinent* than that considered by the PTO." *W. L. Gore & Associates, Inc. v. Garlock, Inc.*, U.S. Court of Appeals for the Federal Circuit, appeal No. 83-613/614, November 14, 1983. Thus, the Court will address the issue of the prior art that was before the examiner.

Also, Hughes asserts that the presumption of patent validity is further strengthened by the fact that the patents have been adjudicated by the Ninth Circuit with

substantially the same evidence as is now before the Court. *RCA v. Radio Engineering Laboratories, Inc.*, 293 U.S. 1, 8-10 (1934); *Farmhand, Inc. v. Anel Engineering*, 693 F.2d 1140, 1143-4, (5th Cir. 1982); *Robertson Rock Bit v. Hughes Tool Co.*, 176 F.2d 783, 790 (5th Cir. 1949) *cert. denied*, 338 U.S. 948 (1950). Dresser's disagreement with this allegation is based on Dresser's contention that the evidence presented to this Court is different from the evidence before the Ninth Circuit. Therefore, the Court will address the issue of the difference in evidence before the Ninth Circuit and evidence before this Court.

Dresser's defense of invalidity mandates that the Court consider the validity of the patents at issue before it addresses the question of infringement. *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 330 (1944). The defense of invalidity in this case centers on two contentions. One contention is lack of novelty under 35 U.S.C. § 102. This requires the Court to review the claims of each patent to determine whether or not all the elements of the patent or their equivalents are found in a single prior art structure where they do substantially the same work in the same way. *Kiva Corp. v. Baker Oil Tools, Inc.*, 412 F.2d 546 (5th Cir. 1969).

The other contention supporting the defense of invalidity is that the inventions are such that they would have been obvious to one of ordinary skill in the rock bit art at the time they were made. This obviousness defense is governed by 35 U.S.C. § 103. The Fifth Circuit has elaborated on the obviousness test first established *in Graham, et al. v. John Deere Co., et al.*, 383 U.S. 1 (1966):

> A patent is invalid if the subject matter sought to be patented would have been obvious at the time the invention was made to a person having ordinary

> skill in the art to which said subject matter pertains. 35 U.S.C. § 103; . . . . Although the question of obviousness under 35 U.S.C. § 103 is one of law, its resolution requires factual inquiries. [The fact-finder] may properly resolve such factual questions as the scope and content of the prior art, the differences between the prior art and the claims at issue, and the level of ordinary skill in the pertinent art. . . . Skepticism of experts, commercial success, long felt but unsolved needs, and the failure of others are relevant secondary considerations. [cites omitted.]

Ebeling v. Pak-Mor Mfg. Co., 683 F.2d 909, 911 (5th Cir. 1982). The Court will follow these guidelines in its discussion of validity of the patents at issue.

IV. *The '928 Patent*

A. *The Scope and Content of Prior Art*

Edward Galle, a rock bit engineer at Hughes, filed an application on November 8, 1965 upon which the '928 patent issued on August 20, 1968. This patent issued to Plaintiff Hughes upon assignment of Mr. Galle, and, thus, Hughes is the owner of the '928 patent. Only claims 1 through 4 and 7 through 10 are in issue in this case. The '928 patent, in general terms, involves an O-ring or packing ring positioned in a groove, thus forming a seal for a rock bit, with the O-ring "compressed by not less than substantially ten percent of its thickness prior to assembly" (PX-1, claim 1). A brief discussion of the history of rock bit engineering will facilitate the Court's discussion of the prior art in relation to the '928 patent.

The first rolling cutter rock bits appeared in 1909, using journal or friction bearings and requiring lubricators to supply grease for the bearings. In the 1930's the "anti-friction" bearing appeared. The resulting "roller bearing bits" did not require grease lubrication,

and, instead, used "slush lubrication" with the abrasive drilling fluid around the bit entering the bearings and circulating around the rollers.

In the late 1950's, a sealed bearing rock bit was invented (Hughes U.S. Patent 3,075,781, now expired). The sealed bit utilized an anti-friction roller bearing, an internal supply of grease, and the "Belleville" or "Standard" Seal.

At that point in rock bit history, and in light of the successful sealed roller bearing bits, some rock bit engineers turned their efforts toward inventing a successful seal for journal bearings. While Hughes acknowledges that O-rings had been used as seals in rock bit bearings in previous patents, it asserts that Galle's use of O-rings in combination with journal concepts and Galle's requirement of at least a 10% squeeze was contrary to the teachings and knowledge of rock bit engineers of his time.

Dresser attacks this statement, listing the Scott Patent (DXL-1), Neilson Patent, (DXL-8), Turner Patent (DXL-4), Reed Patent (DXL-2), Green Patent (DXL-5), and Gros Patent (DXL-7) as all showing the use of O-rings or similar resilient packing rings for rotary shaft seals of rock bits. Also, Dresser refers to the Kirkpatrick Patent (DXL-3) in which the problem of dirt and grit damaging the seal of a downhole tool was addressed (and solved by using a relatively soft durometer rubber). Dresser notes that the Gros Patent (DXL-7) proposed that an O-ring seal be used in a high speed bit. Furthermore, Dresser asserts that the Parks Patent (DX-O) Green Patent (DXL-5), and Turner Patent (DXL-4) each disclose packing-ring-sealed journal bearing bits. In conclusion, Dresser argues that *all* elements of the combination of the '928 patent are disclosed in these prior art patents, *except* the exact amount of squeeze or compression to be used on the packing rings in the bits.

With regard to the compression of the rings, Dresser states that an article by John Holt and William Miller entitled "Selection and Application of Dynamic Seals and Packings" which appeared in the October 31, 1957 issue of *Machine Design* clearly establishes the need for a minimum squeeze of 10%. Also, Dresser asserts that while Hughes does acknowledge the Parker Handbook, Hughes ignores the prior art in the teachings of other O-ring Seal Catalogs such as found in "Linear O-ring Packings" (DXK-3), "Crane Specification and Data Book" (DXK-4), "Precision Handbook of O-ring and Dyna-seal Packings" (DXK-5), and the Military Specification (DXK-1). According to Dresser, these catalogs establish the fact that squeezes of more than 10% were commonly used for slow rotary seals.

The Court notes that the prior art presented to the patent examiner included the Turner and Neilson patents (referred to above) as well as the Christensen, Naab, Arnot, Taylor, Ross, Norick, Swartz, and Hildebrandt U.S. patents; three foreign patents; and the Parker O-ring Seal Handbook. In addition, two affidavits were presented to the patent examiner showing improved performance from the interference specified by Hughes. Also, copies of correspondence with two manufacturers concerning O-ring interferences, sizes, and durometer hardness were submitted to the examiner. Two additional affidavits (by Galle and Kistler) discussing the interferences used in prior tests were also before the examiner.

B. *Differences Between Prior Art and Claims at Issue*

As discussed above, Dresser asserts that the patents before the examiner revealed all of the elements of the '928 patent except the requirement of a squeeze of "not less than substantially 10%." The Court agrees. While some patents which were before the Ninth Circuit and also before this Court were not presented to the patent

examiner, the Court finds that the patent examiner considered patents which were just as close to the patented invention as those patents presented to this Court.

With regard to the additional items of prior art, such as the Holt and Miller article, the Military Specifications, and the additional O-ring Catalogs, and their relationship to the '928 patent, the Court must address the threshold issue of whether rock bit seals must withstand the effects of high speeds and high temperatures. Dresser asserts that seals for rock bits should be classified as seals for low speed and low temperature rotary applications, and that the information in the additional items of prior art, which were not before the examiner, clearly advise minimum squeezes of 10% for such low speed and low temperature uses. On the other hand, Hughes states that rock bits are run under adverse conditions such as high temperatures, and are sometimes run at high speeds, and that none of the additional items of prior art would support a conclusion of invalidity of the '928 patent. Considering all of the evidence in this case, the Court finds that rock bit bearings are run under high speed and high temperature rotary conditions.

In the early 1960's, when Galle was working on what would become the '928 patent, field observations and drilling data revealed "common practice" of employing speeds up to 220 r.p.m. for 9⅞ and 12¼ inch bits. (See Plaintiff's Exhibit 127.) These speeds resulted in sliding friction on the surface of the seal of over 390 feet per minute. There was some evidence to indicate that speeds of over 300 r.p.m. were being employed, with results as high as 540 feet per minute.[2] The Court is aware these high speeds might not be the "normal" application of rock bits, but the Court notes that a rock bit engineer must create a rock bit that is not only able

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[2] Plaintiff presented evidence of recent runs of Hughes bits embodying the '928 invention. These included some 12¼ inch bits being run at 130 to 180 r.p.m., resulting in surface sliding speeds of 200 feet per minute to 324 f.p.m. (PX 124, 126).

to withstand "normal" use, but also to endure the upper limits of the uses for which it could foreseeably be employed.

Dresser does not deny that the Parker O-ring Catalog considered 200 feet per minute as the upper limit on slow speed operation (a figure well below the speeds at which rock bits were shown to have been operated in the 1960's). However, Dresser presents additional prior art for the Court's consideration: the Crane Catalog (DXK-4 at page 12) suggests speeds of 350 feet per minute for an upper limit on low rotary speeds and the Holt and Miller Article considered speeds of less than 300 feet per minute to be slow speeds. These speeds were all exceeded according to the data involving actual use of rock bits in the early 1960's. Mr. McCuistion, Dresser's O-ring expert, testified that the catalogs in the prior art treated slow rotary speeds and fast rotary speeds as two separate and distinct concepts, requiring entirely different considerations, and having two separate charts for their recommended sizes, squeezes, and other relevant data.

Without exception, the catalogs recommended higher squeezes for slow rotary speeds and lower squeezes for fast rotary speeds. The Court finds that rock bit engineers in the 1960's would have consulted the charts for fast rotary speeds and would have concluded that squeezes well below 10% were the proper squeezes for rock bit O-ring seals.

However, even if the Court agreed with Dresser's contention that rock bits are run at slow rotary speeds, the Court does not find that it logically follows that these catalogs and military specifications represent prior art which makes the '928 patent obvious. First, the Court notes that a rock bit engineer using the Military Specifications MIL-P-5514D, which establishes criteria for use and application of packings, gaskets, packing and gasket

glands in hydraulic equipment requiring both static and dynamic seals, would not carelessly turn to Table I, (DXK-1, pages 6-7) without first reading the general instructions given with this table. In Section 3.8 entitled "Design data on use of dynamic and static seals" the engineer would find the warning in Section 3.8.4 that "O-ring packings and gaskets have some general limitations which should be kept in mind when designing hydraulic units." The list of such limitations includes warnings about friction problems of O-rings, use of O-ring seals in rapidly oscillating mechanisms not always being successful, and problems with increased temperatures or strains on O-rings.

Also, Section 3.8.4.3. states: "Standard packings are not specifically designed as rotary seals. However where infrequent rotary motion or low peripheral velocity is required they may be used, provided consistent surface finishes over the entire gland are used and accurate control of eccentricities is adhered to." (DXK-1, page 14). A rock bit engineer, seeing these warnings, would probably conclude that Table I should not automatically be followed, and that further investigations of the special conditions involved in sealing a rock bit must be made. The Court also notes that some minimum squeezes of less than 10% are, in fact, called for by Table I, which is contrary to Galle's requirement in the '928 patent that the squeeze must not be less than 10%.

Also, the Court notes that the Crane catalog (DXK-4) gives some "General Notes on O-ring Packings" in which warnings about temperature variations, pressures, friction, and the need to keep all installations free of dirt and grit are found. When those warnings are considered in light of the statement that "O-ring packings have given excellent service on slowly revolving shafts where the heat is dissipated, or on oscillating valve stems" the Court finds that some doubt in the mind of a rock bit engineer would probably exist as to the use of O-rings

in rock bits, with the extremely abrasive conditions they would encounter.

The Precision Catalog (DXK-5) goes even further in its explanation of the "Jaule effect" in rubber. On page 11, it states it was once impossible to use O-rings as seals for a rotating shaft except at very slow rates of motion. It goes on to explain that experiments have led to a set of principles to be followed for faster speeds up to 600 feet per minute. It warns "Care must be exercised in designing an O-ring into a rotating shaft seal to provide good lubrication and cooling to dissipate the heat from the contact fact." (DXK-5 at page 11). To counter the "Jaule effect," the Precision Catalog suggests "cross section squeeze of about 5%" (DXK-5 at page 12). In light of the Precision Catalog's additional warnings about heat, lubrication, and friction, and the statement that "[h]ydraulic or air pressure in the system also causes higher unit loading of seals and will cause premature failures at even lower shaft speeds" (DXK-5 at page 12), the prior art evidenced by this catalog would probably discourage a rock bit engineer from considering the use of O-rings in a rock bit, and, if an engineer were to insist on trying to use O-rings in rock bits, this catalog would guide him to a 5% squeeze.

Furthermore, the Court finds that the Holt and Miller article (DXM-1) describes advantages in the use of O-rings in reciprocating applications, but it then states:

> Neither of these effects is present in a rotary application. Elastic and fluid pressures tend to squeeze out the lubricating fluid at the contact face, and continuous operation against the same small area of metal induces excessive localized heating. If severe enough, this action damages the rubber compound and possibly the shaft, and sealing is impaired. Hence, rotary sealing with O-rings is limited by both pressure and surface speed. No definite limits are set, but generally 300 fpm is considered maxi-

> mum rubbing speed at very low pressure. As speed is decreased, pressure can be increased, the practical limit being a static seal installation at about 1500 psi pressure.

(DMX-1 at page 92). The Court notes that the 300 f.p.m. was not presented as an absolute limit, but was the upper limit *if* there was "very low pressure." When the variables in the formula changed, with the pressure increasing, then the 300 f.p.m. limit would no longer apply, and, would be reduced proportionately. This is in accord with the warnings and statements in the other O-ring catalogs, including the Parker O-ring Handbook which was before the patent examiner, and the Court again sees reasons for a rock bit engineer, when considering the severe conditions such as temperature, pressure, friction, and abrasive materials in a rock bit, to hesitate to apply the charts designated for low speed and low temperature seals.

In conclusion the Court finds that the evidence before the Court does not support Dresser's assertion that the prior art clearly called for a minimum of a 10% squeeze when O-rings are used in rock bits which are sometimes run at high speeds and which are subject to abrasive conditions during "normal" use. The Court further finds that there has been no showing of any prior art which was "more pertinent" than that considered by the PTO.

C. *Level of Ordinary Skill in the Art*

The parties to this suit have agreed that the level of ordinary skill in the pertinent art is that of the rock bit design engineer employed as such by a manufacturer of rolling cutter rock bits. According to that factual standard, Hughes presented the following rock bit design engineers: George Cason of Dresser, Robert Cunningham of Hughes and William Robinson of Smith Tool Company to testify as to whether the '928 patent would have been

obvious to them at the time the invention was made in the 1960's. That evidence strengthens the Court's discussion above of the probable doubts that would exist in a rock bit engineer's mind when deciding whether to use an O-ring seal in a rock bit and, if he did use an O-ring, whether to squeeze it more than 10%.

With the development of the Belleville seal in 1960 and the success of the Belleville sealed roller bearing bits, the rock bit engineers attempted to devise a method of sealing journal bearings which could potentially result in even greater life capacity for the bits. Hughes, Dresser, Smith, and Reed each initiated company projects with that goal in mind.

The first attempts sought to seal journal bearings with Belleville seals. The "SS" bits of Smith and the "FBC" bits of Reed were built, tested, and placed on the market for a short time, without notable success (Tr. 151, PX 42). Hughes combined a silver alloy as a solid lubricant in a journal bearing with a Belleville seal. This did not work to satisfaction, and Cunningham abandoned his efforts. Dresser combined journal bearings with Belleville seals and found the result to be "spotty and not predictable" (PX 72, page 23). Thereafter, Dresser cancelled the projects because "the present design has not been successful" (PX 28).

The question of using O-rings instead of Belleville seals apparently arose in each of the rock bit companies. For example, one of the engineers at Dresser suggested the use of an O-ring and Cason disagreed stating that the O-ring "wasn't well thought of in the industry at that time" (PX 69, page 24). Nevertheless, efforts to use O-rings were made, and several patents, now before the Court, were issued as a result of these efforts. However, the evidence before the Court further strengthens the Court's conclusion that rock bit engineers would probably have serious doubts as to the use of squeezes over

10% with O-rings. The actions of the rock bit engineers bear out that fact. For example, when Robinson, working for Smith, applied for his patent using O-rings he taught to use a squeeze of less than 10% (PX 13). The Court notes the following words in that patent: "No matter what its cross-section, the extent of compression of an O-ring is limited, and in a rotary seal excessive compression leads to rapid wear and deterioration of the O-ring" (PX 13, p. 6). Similarly, Cason's co-workers consulted the O-ring literature in 1970 and advised him to use a 5% squeeze (PX 47). Previously, Neilson, working for Smith, had called for placing the O-ring remotely from the bearing surfaces (unlike the '928 patent) and for squeezing it only "slightly" when he applied for his patent (PX 11). Even Galle's own colleagues consulted the handbooks and recommended a 5% squeeze for O-rings (PX 122).

The United States Court of Appeals for the Federal Circuit has stated in *Gore supra:*

> On the entire record and in view of all the references, each in its entirety, it is clear that a person of ordinary skill confronted with a PTFE tape breakage problem would have either slowed the rate of stretching or increased the temperature to decrease the crystallinity. Dr. Gore did neither. He proceeded contrary to the accepted wisdom of the prior art by dramatically increasing the rate and length of stretch *and* retaining crystallinity. That fact is strong evidence of nonobviousness. *United States v. Adams*, 383 U.S. 39 (1966).

A closely analogous description can be made in the present case: On the entire record and in view of all the references, each in its entirety, it is clear that a person of ordinary skill confronted with the question of what seal to use to extend the life of a rock bit would have either refused to use an O-ring, or would have used the

O-ring with a squeeze below 10%. Mr. Galle did neither. He proceeded contrary to the accepted wisdom of the prior art by using a rock bit *and* requiring a minimum of a 10% squeeze. That fact is strong evidence of non-obviousness.

Dresser asserts that the Court must not look only to rock bit design engineers, but must consider the testimony of O-ring experts, such as Mr. Swartz and Mr. McCuistion, in its consideration of the level of ordinary skill in the art. The Court disagrees with this assertion. However, even if the testimony of O-ring experts should be considered, the Court notes that Mr. Swartz and Mr. McCuistion both testified that they knew of no prior art which taught to never permit a squeeze of below about 10% in a rotary seal application. All catalogs and articles they discussed included squeezes both above and below 10% for such applications. Furthermore, while their testimony clarified the fact that the '928 patent would work successfully with minimum squeezes of at least 10% on the O-ring, the testimony did not convince this Court that those two O-ring experts would have come to the same conclusions and used the same reasoning in the 1960's when Galle was working on the invention.

Also, Dresser argues that Klosinski, an O-ring expert, recommended an 11.9% squeeze in 1969 when asked about use of an O-ring in a rock bit (PX 3, p. 203-204). However, as the Court considers the evidence of what that O-ring expert said in 1969, it notes that the 11.5% squeeze was the median, not the minimum squeeze given. The minimum was about 8.9%. More importantly, the letter by Klosinski indicated that the use of an O-ring was questionable in rock bits because of the diametrical clearance and erratic motion involved and because the "high operating temperatures in conjunction with an abrasive media may contribute substantially to seal deterioration" (PX 3, p. 203-204).

It is well-settled that a Court may also look at relevant secondary considerations such as skepticism of experts, commercial success, long felt but unsolved needs, and the failure of others in determining the question of obviousness. The Court will now examine the evidence in this case regarding those considerations.

The Supreme Court in *United States v. Adams*, 383 U.S. 39 (1966) found that each of the elements in a patent had been used previously, but went on to find the invention would not have been obvious because of such facts as: the experts in the field "did not believe the battery was workable" *Adams* at 44; several of the same experts subsequently recognized the Adams invention; the battery "far surpassed then-existing wet batteries" *Adams* at 51; and "Long-accepted factors . . . would deter any investigation into such a combination" *Adams* at 52. The evidence in the present case reveals similar facts. For example, both Cason of Dresser and Robinson of Smith were skeptical about the teachings of Galle's '928 patent. Cason doubted the merits of the O-ring over the Belleville seal and Robinson did not believe that the O-ring should always be squeezed more than 10% (PX 75, p. 131-132.)

Their skepticism was finally set aside when the commercial success of the '928 patent increased the pressure on Dresser and Smith to create a competitive rock bit. The testimony of Robinson and Cason reveals that they eventually chose to copy the patented feature (PX 75, p. 127 and Tr. 151). As the Fifth Circuit has stated: "Assuming that imitation is the sincerest form of flattery converts Brunner & Lay's president to Ingersoll-Rand's best witness, for he conceded that promptly upon learning of the widespread use and acceptance of Ingersoll-Rand's rod he attempted to copy it." *Ingersoll-Rand* at 497.

The marked improvement in rock bits and the resulting commercial success of the '928 patent were described by

Dresser's product manager, Mr. Jackson. In one case, according to Mr. Jackson, Hughes' bits with the '928 patented seal drilled 53.8 hours longer and 168 percent more footage than Dresser's roller bearing bits with the Belleville seals (PX 39). In Oklahoma the Hughes' bits ran 78.8 hours longer, with 214 percent more footage than Dresser's bits (PX 39). The Hughes bits with the '928 patent were estimated to be "200 percent or more better" than Dresser's 588 bits (PX 34, 35). Mr. Kistler, Hughes' president, testified that the new bit had increased the average footage drilled by 40 to 50 percent, had reduced hazardous trip time 50 percent and had reduced the number of bits required to drill a well by 40 percent.

The obvious result of such improvements was that the '928 patent produced great commercial success. The evidence before the Court shows alarm on the part of Hughes' competitors; serious efforts by others to design alternative competitive structures; numerous comments such as ". . . we can expect to lose 50 to 65% of the monthly market" by Dresser (PX 39); and a billion dollar market for the '928 patent with a corresponding obsolescence of the Belleville-sealed roller bearing bits. In conclusion, all of the secondary considerations before the Court strongly support the conclusion that the '928 patent would not have been obvious to a person having ordinary skill in the art of designing rock bits.

Dresser has also asserted that there is no showing of "criticality" of the requirement of a minimum of 10% squeeze in the '928 patent. The Court disagrees. To prove the existence of a criticality here, Hughes must show that the limitation is "critical in fact" or produces a difference in kind. *Brown-Bridge Mills, Inc. v. Eastern Fine Pager, Inc.*, 700 F.2d 759, 763 (1st Cir. 1983); *Helene Curtis Indus., Inc. v. Sales Affiliates*, 233 F.2d 148, 152 (2nd Cir. 1956). It has been held that "unexpected results" and a "marked improvement" were to be

"classified as a difference in kind rather than one of degree." *Application of Waymouth*, 499 F.2d 1273, 1276 (C.C.P.A. 1974). The Court also notes that it is not limited to examining the evidence which was before the patent examiner to determine whether a criticality exists. Rather, it may look to all evidence which was later developed and presented at trial. *Helene Curtis* at 154.

Dresser attacks the data presented to the patent examiner as being "insufficient in fact or law" to show criticality of a 10% squeeze. The Court does find some concern in the limited number of tests and the squeezes and controls used in the tests which were before the examiner. However, the evidence that has been developed in the fifteen years following the issuance of the '928 patent has undeniably shown "marked improvement" and "unexpected results." Even after the Hughes bits with the '928 patent began to enjoy success in the field, other rock bit experts continued to remain skeptical and deny that a minimum of a 10% squeeze on an O-ring could produce such results.

Here, Dresser would assert that those other O-ring experts were correct, and that it was not the 10% squeeze but other factors which resulted in the commercial successes that Hughes was enjoying. One such factor contributing to the success, according to Dresser, was the silver-slotted journal bearing of the Whanger patent. However, Hughes notes that it is not using the silver-slotted journal bearing in its successful bits today, but that the 10% squeeze on the O-ring is still essential. Furthermore, when Dresser was under pressure to make a competitive bit, it did not use the silver-slotted journal bearing, but it did copy the minimum 10% squeeze, in order to achieve the outstanding results that such a squeeze had made possible. Thus, it appears that the O-ring with a minimum squeeze of 10% enabled various metalurgies to be used successfully for increased hours of performance before the bit (not the O-ring) failed. In contrast, the silver-slotted bearing could not achieve its

extended life-time if a seal other than an O-ring with 10% squeeze were used—due to the early failure of the seal.

Likewise, the other inventions that Dresser suggests were the reasons for Hughes' success with its commercial journal bearing bits were each inventions that could have been altered or changed without effecting the overall success of the bits. On the other hand, the minimum 10% squeeze was the one unalterable factor that both Hughes and all of its competitors found to be essential to a longer-life bit.

In conclusion, the Court finds that there is ample evidence showing the criticality of a minimum of a 10% squeeze. The results of such a squeeze were contrary to the thinking of rock bit engineers in the 1960's; such a squeeze produced a rock bit that was 200% better than the previous bits, as estimated by Dresser's own personnel; and the criticality of that minimum squeeze inevitably led to the same requirement of a minimum 10% squeeze (or greater) by Hughes' competitors.

D. *The Evidence Before the Ninth Circuit*

The principles of "comity" suggest that although the decision of the Ninth Circuit in *Smith* is not binding on the validity of the patent in this case, this Court should follow rather than reject the opinion of that court of appeals, unless new defenses or new evidence is before this Court. Mr. McCuistion did not testify in California and the Military Specification and Holt and Miller article were not before the Court in California. However, the Military Specifications and the Holt and Miller article presented no new evidence as to what the prior art taught in the 1960's at the time of Galle's invention. In those articles, this Court finds the same warnings and cautions (concerning use of O-rings in such adverse conditions as existed in rock bits) that were before the Ninth Circuit. Also, Mr. McCuistion's testimony failed to convince this

Court that the prior art and the level of ordinary skill of rock bit engineers was any different than that presented to the Ninth Circuit. Thus, as a matter of comity, the Court should follow the decision of the Ninth Circuit.

Furthermore, the Court would strongly note that even if there were no decision from any court of appeals regarding the validity of this patent, and even if no principles of comity applied in this case, the trial before the Court reveals a record replete with evidence supporting the validity of the '928 patent. The discussion above clearly establishes that the use of an O-ring with a minimum of a 10% squeeze in a rock bit would not have been obvious to a person having ordinary skill in the art to which the subject matter pertained. Additionally, the discussion above reveals that there was no "anticipation" of the '928 patent in any of the previous patents or prior art in the field of rock bits. Dresser's "anticipation" defense as to the '928 patent requires that the same elements are found in the same situation and united in the same way to perform a similar function. *McCullough Tool v. Well Surveys*, 343 F.2d 381, 398 (10th Cir. 1965). There is no evidence to show any such anticipation of the '928 patent. The Court concludes that the '928 patent is valid and Defendant Dresser has not sustained its burden of proving that the invention was anticipated by another patent pursuant to 35 U.S.C. § 102 nor has it sustained its burden of proving that the invention as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the rock bit art pursuant to 35 U.S.C. § 103.

E. *Infringement*

Dresser has not denied its infringement of the '928 patent. Dresser's former president, Mr. McQueen, and Dresser's counsel both conceded the use of the '928 patent and its principles. In answers to interrogatories, Dresser identified each model number of the various accused bits.

When Galle testified at trial as to the squeeze measurements of actual Dresser bits as being between 10.5% and 18%, no denial of this was made by Dresser. The concessions of Dresser's witnesses, Cason, Jackson, Sartor, Keller, and McQueen as well as its own records (PX 17, 18, 5a), all evidence Dresser's infringement of the '928 patent.

Infringement of a patent under 35 U.S.C. § 271 provides:

> . . . whoever without authority makes, uses or sells any patented invention, within the United States during the term of the patent therefor, infringes the patent.

Dresser does not deny that it made, used, or sold journal bearing rock bits with O-ring seals squeezed at least 10%. It does not deny that its bits fall within the claims of the '928 patent. Thus, the Court concludes Dresser has infringed the '928 patent, in each of the bits produced in evidence before this Court.

F. *Damages*

In patent infringement actions 35 U.S.C. § 284 provides:

> § 284 DAMAGES: Upon finding for the claimant, the court shall award the claimant damages adequate to compensate for the infringement, but in no event less than a reasonable royalty for the use made of the invention by the infringer, together with interest and costs as fixed by the court . . . . the court may increase the damages up to three times the amount found or assessed.

In *Yale Lock Co. v. Sargent*, 117 U.S. 536, 552 (1885), the Supreme Court defined adequate compensation as "the difference between [the patentee's] pecuniary condition after the infringement and what his condition would have been if the infringement had not occurred." Under this

definition a patentee may try to show the profits which he would have made on sales taken by the infringer. To carry his burden of proof, the patentee must show four facts: (1) demand for the patented produce, (2) absence of viable non-infringing alternatives, (3) the patentee's manufacturing and marketing capability to exploit the demand, and (4) the amount of profit the patentee would have made. *Panduit Corp. v. Stahlin Bros. Fibre Works*, 575 F.2d 1152, 1156 (6th Cir. 1978).

If this proof of "lost profits" is inadequate, then the Court should apply the "willing buyer—willing seller" rule in determining a reasonable royalty under that section. This rule would create a license agreement arrived at by hypothetical negotiations in a meeting between the patent owner and the potential infringer at the time the infringement began, assuming each were acting rationally and prudently in reaching that agreement. *Georgia Pacific Corp. v. United States Plywood-Champion Papers, Inc.*, 446 F.2d 235 (2nd Circuit, 1971).

In the present case, Hughes seeks lost profits with respect to the insert journal bearing bits which Dresser sold to customers within the United States (or, in the alternative, a reasonable royalty). As to all other infringing sales, including insert journal bearing bits manufactured in the United States and sold to customers outside the United States and steel tooth bits which were manufacured in the United States and sold in the United States and abroad, Hughes seeks a reasonable royalty.

The evidence in this case leaves no doubt in the Court's mind that customer demand for the patented bits was strong throughout the years in question. As soon as they were introduced in late 1969 a shift to the Hughes bits was noted and continued to grow beyond the estimates made in those early years (PX 38, 39, 82, 83, 87). Dresser does not offer any evidence contradicting the evidence produced by Hughes, and Hughes has carried

its burden of proof regarding the demand for the patented product.

Next, the Court must determine whether there existed any acceptable non-infringing alternatives for the patented insert journal bearing bits. Hughes' statement in 1972 that "a workable journal bearing can be, and is being manufactured by one of the Company's competitors without using the o-ring device" (DX-T, p. 24), arguably suggests that such an alternative did exist.

Dresser argues that the "workable" insert journal bearing bits were sealed with a Belleville seal or an elongated packing ring (Dresser's Post-Trial Brief Regarding Damages, page 4). These bits were marketed by Reed Tool Company and by Dresser. The evidence before the Court reveals that the Hughes bits drilled almost twice as much footage as the Reed bits and Dresser's own characterization of the Reed bits revealed "below average" performance (PX 42, 98, 100, 101). Similarly, the Dresser journal bearing bits with Belleville seals did not give Dresser the performance it wanted and, according to Mr. Cason, operation of these bits had "never been successfully done." (PX 72, p. 23-24).

The Court is aware that if there had been no Hughes patented bits and no infringing bits on the market during the years in question then the drilling industry would have turned to less attractive bits such as the Belleville-sealed bits as substitutes. Thus, it may be argued that this case is analogous to *Hughes v. Murphy*, 491 F.2d 923 (5th Cir. 1973). There the availability of a non-infringing two-piece seal led to the Court's determination that a "commercially viable alternative" did exist, even though the two-piece seal was undeniably less efficient and more costly than the patented seal, and regardless of the fact that it was never put into actual production and only 40 such bits were ever made and sold.

On the other hand, the concept of an "acceptable" substitute has been described in the following way:

> . . . The prior district and appellate court opinions leave no doubt that the patented product filled a waiting need and met with commercial success due to its merits. [The infringer's] own intra-company memo and its $1,788,384 sales of infringing ducts during the period when allegedly acceptable non-infringing substitutes are now said to have been available, leave no doubt that the patented improvement created a substantial customer preference. A product lacking the advantage of that patented can hardly be termed a substitute "acceptable" to the customer who wants those advantages. . . .
>
> The "acceptable substitute" element, though it is to be considered, must be viewed of limited influence where the infringer knowingly made and sold the patented product for years while ignoring the "substitute." There are substitute products for virtually every patented product: the availability of railroads and box cameras should not of itself diminish royalties payable for infringement of the right to exclude others from making and selling the Wright airplane or the Polaroid camera.

Panduit at 1162 and 1162, note 9.

Hughes' patented o-ring-sealed journal bearing bits were also a patented improvement. Within the definition of an "improvement" an argument can always be created that there exists a device minus the improvement which is an "acceptable" substitute. However, unlike the *Hughes v. Murphy* case, the evidence in the present case makes it clear that there was a substantial customer preference for the advantage of the patented o-ring sealed bit (see *Hughes v. Murphy*, note 6). The non-infringing journal bearing bits did not offer these advantages to the consumer and, thus, the demand for the patented

bits (and infringing bits) continued to increase dramatically even in the fact of higher sales prices (PX 81, 89).

Dresser also suggests that the sealed roller bearing bits were competitive with the patented bits in "certain conditions." The Court finds that different types of bits had different uses in the drilling industry according to their difference in performance (PX 979). Thus, one type of bit was preferred for top hole drilling, while another was preferred for drilling below that. These differences in uses meant that the purchases of sealed roller bearing bits were for uses which were independent of the uses in which the patented bit offered its advantages, and no cross-substitution was made in these different uses (PX 42, PX 102, p. 85-87). Thus, the Court concludes there were no acceptable non-infringing alternatives to the patented bit.

With regard to the manufacturing and marketing capability of Hughes to exploit the demand for o-ring-sealed journal bearing bits, the Court finds that Hughes has not met its burden on this issue. Hughes asserts that it had sufficient unsold inventory for six of the ten years of Dresser's infringement to have made the sales which Dresser took. However, it admits that in the remaining four years, it did not have sufficient inventory to make all sales.

The Fifth Circuit has stated that a patent holder does not "in order to demonstrate a loss, have to build a plant which, because of the Infringer's conduct, would not have been fully utilized." *Livesay Window Co. v. Livesay Industries*, 251 F.2d 469 (5th Cir. 1958). Supported by this statement, Hughes has produced exhibits showing the additional equipment it needed and expansions it would have had to make, in order to adequately increase its inventory to meet the demand (PX 106).

Also, Hughes has estimated its profits on the patented bits it actually sold, and has asserted that such profits

plus its lines of credit would have enabled it to expand its production as needed (PX 104). However, the Court has some questions concerning the estimates of Hughes' profits (discussed more fully below) and the Court notes that Hughes had some difficulty meeting its own customer demand for the bits (not to mention the demand for the infringing Dresser bits) at certain times during the infringing year. For example, in Hughes' bit records the following statement appears: "100% Hughes hole lost due to availability of rock bits." (DX-NNN). In light of all the evidence in this case, the Court is not convinced that Hughes could have met the demand for all of those infringing bits sold by Dresser, given the time frame, and the explosive growth in demand during the years in question.

The fourth factor, an approximation of the profits that Hughes would have made on the infringing sales, required Hughes to allocate its costs between six product categories. Hughes concedes that such an allocation was made specifically for this litigation and that it had not maintained profit records on a product line basis for any of the years in question. Dresser asserts that numerous details in Hughes' allocation are so unusual as to render the entire allocation unreasonable in light of generally accepted accounting methods and business practices. For example, in its 1972 prospectus, Hughes stated:

> The Company believes that sales of drilling bits are more profitable per dollar of sales than tool joints, although the Company's manufacturing operations are integrated and accurate costs allocations between the two products are not possible.

(DX-T, p. 14). When such an allocation became necessary, Hughes presented figures to this Court showing 5 categories of bits and 1 category entitled "other products." (PX-194). In its United States sales, Hughes shows that in 7 of the 10 years of 1973 through 1982

the "other products" showed *no* income before taxes, and showed only an income before taxes of 4% to 8% of their net sales in the remaining 3 years. In contrast, the insert journal bearing bits generated an income before taxes of 42% to 53% of their net sales during the same years. These figures, admittedly created specifically for this litigation, become especially difficult for the Court to accept in light of the fact that the net sales of "other products" account for roughly one-third of total net sales in the U.S. in each of the years in question.

The Court also has difficulty in finding it reasonable that a company would spend roughly twice as much money on "period costs" such as marketing, manufacturing, and research and development on its "other products" than it spent on its insert journal bearing bits during the same years that the "other products" were losers and the insert journal bearing bits were clearly the big money-makers. While the Court does concede such an allocation may "possibly" be the one which correctly describes the facts as they took place during the years in question, the Court finds the allocation in its entirety to be too speculative to support an award of lost profits. *See Livesay Window Co. v. Livesay Industries, Inc.*, 251 F.2d 469, 471 (5th Cir. 1958); *Electric Pipe Line, Inc. v. Fluid Systems, Inc.*, 250 F.2d 697, 699 (2nd Cir. 1957). In conclusion, the Court finds Hughes has failed to demonstrate with "reasonable probability" an approximation of the profits it would have made on the infringing Dresser sales in the United States.

Thus, the Court must determine, under the "willing-buyer—willing seller" rule, what a reasonable royalty would be in this case. Hughes asserts that 46.59% and 6.21% royalties for the '928 and '195 patents (in insert journal bearing bits respectively), are reasonable, and that a 10% royalty for the '928 patent in conjunction with steel tooth bits is reasonable. Dresser suggests that 0.30% is a reasonable royalty for the '928 used in insert

journal bearing bits, 0.06% for the '928 in steel tooth journal bearings, and 0.04% for the '195 patent.

The Court disagrees with both Hughes and Dresser and will follow the following guidelines as discussed in *Panduit*:

> The setting of a reasonable royalty after infringement cannot be treated, as it was here, as the equivalent of ordinary royalty negotiations among truly "willing" patent owners and licensees. That view would constitute a pretense that the infringement never happened. It would also make an election to infringe a handy means for competitors to impose a "compulsory license" policy upon every patent owner.
>
> Except for the limited risk that the patent owner, over years of litigation, might meet the heavy burden of proving the four elements required for recovery of lost profits, the infringer would have nothing to lose, and everything to gain if he could count on paying only the normal, routine royalty non-infringers might have paid. As said by this court in another context, the infringer would be in a "heads-I-win, tail-you-lose" position.
>
> * * * *
>
> Determination of a "reasonable royalty" after infringement, like many devices in the law, rests on a legal fiction. Created in an effort to "compensate" when profits are not provable, the "reasonable royalty" device conjures a "willing" licensor and licensee, who like Ghosts of Christmas Past, are dimly seen as "negotiating" a "license." There is, of course, no actual willingness on either side, and no license to do anything, the infringer being normally enjoined, as is Stahlin, from further manufacture, use, or sale of the patented product.
>
> The amount of a reasonable royalty after infringement turns on the facts of each case, as best they

> may be determined. Among the relevant facts are: "what plaintiff's property was, to what extent defendant has taken it, its usefulness and commercial value as shown by its advantages over other things and by the extent of its use," . . . and the commercial situation.

[cites omitted]. *Panduit* at 1158-1159.

The Court finds that plaintiff's property was a patented rock bit seal (discussed above) requiring a minimum of a 10% squeeze on the O-ring seal. The Court further finds that defendant has "taken it" by applying the minimum 10% squeeze to its own sealed rock bits, with total sales of $343,354,994 in the years 1973 through 1982.

The usefulness and commercial value of the patent, as shown by its advantages over other sealed rock bits and the extent of its use, are great. The evidence before the Court shows a strong customer preference for the patented rock bit, as already discussed above. The commercial situation, as it existed in 1973, just prior to Dresser's infringement, reveals several important facts.

First, Hughes had invested time, labor, and money into its production of patented insert journal bearing bits, and was experiencing a rising demand for those bits. While Hughes had not made cost allocations between its drilling bits and its tool joints in 1973, it was of the belief that its drilling bits were more profitable per dollar of sales than its tool joints (DX-T, p. 14).

Hughes asserts that it had a policy of not licensing its direct competitors who would take its sales. Dresser disputes this contention, offering evidence of 45 patent license agreements, that Hughes granted to its competitors (DX-000). No licensing agreement offered by Dresser called for a royalty rate in the United States exceeding six percent. However, the Court notes that licenses of a patent owner which authorize the manufacture of

widely diverse products have been held to be only of superficial relevance. *See Georgia-Pacific Corp. v. U.S. Plywood Corp.*, 318 F. Supp. 1116, 1140 (S.D. N.Y. 1970).

With regard to the Gault license, Gault was not a direct competitor of Hughes. Hughes was not involved in the market which Gault supplied. In fact, there is no evidence that Gault ever manufactured under the patents in suit.

Also, the Court notes that licensing agreements made as a result of settlement negotiations may not be considered when determining a reasonable royalty, and should not be used to support the claim that Hughes had a policy of licensing its competitors. *Sce* Rule 408, Federal Rules of Evidence, and *Faulkner v. Gibbs*, 199 F.2d 635 (9th Cir. 1952). Thus, the Court will not consider the 15% license agreement made between Hughes and Rock Bit Industries in 1983 to settle litigation on the '928 patent. In conclusion, the Court finds that while Hughes did license its direct competitors with regard to other patents, it showed no desire to license direct competitors for the use of the '928 patent. Furthermore, the Court finds that the evidence before the Court may be looked to as showing the amount of an established royalty on the '928 patent.

The commercial situation in 1973 also involved the projections and anticipated profits that would have been in the minds of Hughes and Dresser negotiators at the hypothetical meeting being considered by the Court. Dresser had existing facilities to make and sell rock bits. In its concern over losing a large share of the rock bit sales to Hughes, it considered an appropriation for the purchase of additional equipment to manufacture insert journal bearing bits. Dresser's projection suggested total profits of 60% as a percent of sales (PX 82, 93, Response to Request for Admission 11). In the prior year, 1972, Dresser had accepted total profits of 7.2% for all

of its sales (PX 82, Response to Request for Admission 16).

In 1973, Hughes apparently did not believe that demand for roller bearing bits would drop as sharply as it, in fact, did drop in the following years, and thus, Hughes was projecting that sales of sealed roller bearing bits would remain constant until 1978 (DX-XXX). Also Hughes was well aware that its competitors were "working diligently to achieve competitive standards" and Hughes "expect[ed] to see competitive performance on a par with our present performance within a maximum of 24 months [from the date August 5, 1970 of the "Proposal"], probably much less." (PX 111). Hughes asserts that in 1973 it had experienced profits before tax of 54% on foreign sales and 49% on U.S. sales of the insert journal bearing bits.

At this point, Dresser suggests that a reasonable royalty rate should be based on the prior *Hughes v. Murphy* case. The Court finds several points which distinguish the present case from *Murphy*. First, in *Murphy* a commercially viable alternative was found to exist, while no such alternative exists in the present case. Second, the Court in *Murphy* could not determine whether the purchasers of the patented bits were "motivated solely by a desire for the sealed feature or whether other influences were at work." *Hughes v. Murphy* at 929, note 6. The district court suggested that other factors such as "price reliability, versatility, service after sale, [and] company reputation" might have influenced purchasers. *Hughes v. Murphy* at 929. In contrast, this Court has found that customer preference for the patented bits in the present case was based on the advantages of the patented 10% squeeze, and it was not the other factors mentioned above that led to the purchases.

Also, the Court in *Murphy* was dealing with a separate issue of whether the damages should be figured from the loss of the premium (charged for bits with a seal)

or from loss of the total price of the bits. The damages were limited to the seals (and not the total price of the bits), and the royalty was set at 5.68% of the premium, (or 1.25% of the total bit price). At first glance, these small percentages would make Hughes' request for 49% and 54% royalty appear ridiculous. However, on closer examination, the figures offer some support for Hughes' theory. It should first be noted that the premiums received in *Murphy* totaled $2,143,980 of which $163,834 was profit. That is only a 7.64% profit, in contrast to the projection of 60% profit in the present case, admitted by Dresser. The damages awarded by the trial court of $121,824.98 equaled 5.68 percent of the premium $2,143,980, and more importantly, these damages equaled 74% of the profit on the premiums. Hughes' 49% and 54% royalty requests would be 81.6% and 90% of Dresser's projected 60% profits in this case.

On the other hand, the district court in *Murphy* made the specific finding that "had the parties negotiated for a license in 1963 for the patented seal, they would have agreed on a royalty amounting to 1.25 percent of the gross sales price of all bits carrying the seal." *Hughes v. Murphy* at 930. In *Murphy* the total bit sales were $9,745,998 of which $1,469,903 was profit. This was a 15% profit, also a considerably lower profit than those projected in the present case, but less supportive of Hughes' request, since that finding only awarded Hughes 8% of the profit on the total sales of the bits.

Finally, the *Murphy* case reveals another factor of importance in the present case. There the Court recognized that a drill bit is composed of many parts, that numerous such parts may contribute to its overall value, and any number of those parts may be patented, with minimum royalties being paid on each of those parts. *Hughes v. Murphy* at 930-931. That is true of the drill bits in the present case which contain numerous parts (some of which are patented) contributing to the total value of the bit.

As discussed earlier, the patented minimum 10% squeeze on the O-ring added enough life to the seal to permit the drilling industry to realize the full potential of the silver bearing insert bit (and other improvements). While that fact strengthens the Court's finding of a valid patent in this case, it is a *non sequitur* to say that the o-ring is responsible for the entire value of the insert journal bearing bits containing the patented seal. Hughes argues that *Georgia-Pacific Corp. v. U.S. Plywood*, 318 F.Supp. 1116 (S.D.N.Y. 1970) is instructive on this question:

> There is a basic distinction between a patent which is only a part of a machine or structure and which creates only a part of the profits and, on the other hand, a patented article or a patent which gives the entire value to the combination or an article patented as an entirety. Consequently, it is necessary to determine whether the invention extends to and affects the whole article giving it its essential marketability, or whether it is only for an improvement. This distinction and the related problem of apportionment are expounded in such cases as Westinghouse Elec. & Mfg. Co. v. Wagner Elec. & Mfg. Co., 225 U.S. 604, 32 S.Ct. 691, 56 L.Ed. 1222 (1912); Cincinnati Car Co. v. New York Rapid Transit Corp., *supra*; Rockwood v. General Fire Extinguisher Co., 37 F.2d 62 (2 Cir. 1930); and Register Co. v. Standard Register Co., *supra*.

Georgia-Pacific at 1132-1133. The Court agrees this case is instructive and finds the '928 patent does not "extend to and affect the whole article, giving it its essential marketability." Instead this was an improvement over other bits already on the market.

In conclusion, the Court considers the parties in 1973 projecting 49% to 60% profits, and the Court notes (1) that Hughes did not want to license its competitors to use the '928 patent, (2) that there were no available

alternatives, and (3) that Dresser is concerned about its potential loss of 50% to 60% of the market to Hughes. These factors suggest a strong bargaining position for Hughes. On the other hand, the Court finds that the patented O-ring seal was only one of numerous parts which contributed to the overall value of this rock bit. Dr. Bass, plaintiff's expert, concluded that 52.8% was a reasonable royalty for both of the patents in suit. After considering the relative contributions of the '928 and the '195 patents, he apportioned the royalty to be 46.59% for the '928 patent and 6.21% for the '195 patent. However, during the trial Dr. Bass testified that he was assuming the O-ring was responsible "for most of the value of the bit." (Tr. 1719). The Court disagrees with this assumption, finding the '928 patent contributed only part of the total value of the bit. Thus, the Court finds that, had the parties negotiated for a license in 1973, they would have agreed on a royalty amounting to 25% of the gross sales price of all insert journal bearing bits sold in the United States and abroad.

Hughes asserts that the '928 was used in its steel tooth journal bearing bits. Hughes concedes the profits were not as great in these bits, and submits that a royalty of 10 percent would have been reasonable. The Court notes the 10% squeeze on O-rings in the steel tooth journal bearing bits did not produce the impressive results that were seen in the insert journal bearing bits and, thus, the Court finds the '928 seal contributed only 5% of the value of these bits. Therefore the Court finds a 5% royalty is reasonable for steel tooth journal bearing bits using the '928 patent.

In *General Motors Corp. v. Devex Corp.*, —— U.S. ——, 103 S.Ct. Reporter 2058, (1983) the Supreme Court held "that prejudgment interest should be awarded under § 284 absent some justification for withholding such an award." During the years 1973 through 1983 interest rates have varied greatly. For example, Hughes

states that according to Dresser's credit rating it would have paid varying interest rates from 8.49% to 15.29% if it had borrowed the money which is now to be paid to Hughes. The Court, in light of this variation, finds that 10% is an appropriate rate for the prejudgment interest in this case.

Finally, the Court reaches the issue of whether it should increase the damages in this case for "wilful and deliberate" infringement. Three factors have been held to be important in this consideration: (1) "whether the infringer deliberately copied the ideas or design of another"; (2) "whether the infringer, when he knew or should have known of the other's patent protection, reasonably investigated the scope of the patent and formed a good faith belief that the patent was invalid or that it was not infringed; and (3) "the infringer's behavior as a party to the litigation" *Lam, Inc. v. Johns-Manville Corp.*, 668 F.2d 462 at 475 (10th Cir., 1982), *cert. denied*, 102 S.Ct. 2298 (1982).

The Court finds that Dresser did deliberately copy the ideas and designs in the '928 patent. The Court finds that Dresser reasonably investigated the scope of the patent and formed a good faith belief that the patent was invalid. The question of the minimum 10% squeeze on an O-ring is at least debatable and a Federal District Court (although later reversed) agreed with the attorney who first advised Dresser that the patent was invalid. Also, the Court finds that Dresser's conduct during this litigation does not warrant increasing the damages. *See also*: *Deere v. International*, 658 F.2d 1137, *cert. denied*, 454 U.S. 969 (1981). Thus, the Court will not increase the damages.

V. *The '195 Patent*

Hughes is also the owner of the '195 patent, a relief valve design, and alleges infringement by Dresser of that patent. Dresser asserts that 35 U.S.C. § 102 provides for

the defense of lack of novelty or "anticipation" and that such defense is clearly applicable here. The Court agrees.

The Parks patent (DXO; U.S. Patent No. 2,906,504) contains all of the elements of the '195 patent claims. Although a presumption of validity is accorded to patented inventions by statute, 35 U.S.C. § 282, that presumption is weakened when it appears that "more pertinent" prior art than that considered by the PTO was available. *Gore* at 25. Neither the Patent office nor Hughes was aware of the prior art of the Parks patent according to the file history of the '195 patent (DXN, p. EP-113).

The '195 relief valve was intended to allow the escape of excess pressure from the bearing in rock bits such as those described above. Mr. Galle provided a bicycle-type spring-loaded valve to accomplish the pressure relief.[3] An examination of the Parks and the '195 patents reveals Parks also provided a relief valve for the bearing when the pressure outside the bearing increased. The Court finds the only difference between them was that Parks desired to keep a slight affirmative pressure inside the bearing of his bit.

Hughes summarized the invention as "the discovery that any low pressure relief valve may be formed in such a passage to prevent excess pressure build-up in the lubricant and thereby avoid the damaging effects of such pressure." (DXN, p. EP-113). That is precisely what the Parks patent had already discovered and disclosed *before* the time of the '195 patent.

The Court notes that Dr. Cheatham compared the language of the '195 patent and the Parks patent claims. He explained that all of the elements of the '195 patent are found in Parks. He also testified, in response to the assertion that there is no compensation system in the

[3] The Court would note that there were numerous problems with the valve and it was eventually eliminated from drill bits.

Parks patent, that both the diaphragm compensator in the Galle patent and the compensation system in the Parks patent served the similar purpose of allowing control over the lubricant chamber pressure as the drilling reached deeper depths. He specifically stated that the lubricant relief valve in Parks performed the same task as the relief valve in the Galle patent (Tr. 1215). The Court agrees.

Hughes may argue that this court should, as a matter of comity, follow the Ninth Circuits determination that the '195 patent was valid. This Court finds the following language in the Ninth Circuit's opinion:

> The '195 Patent is also a combination patent because it combines a pressure relief valve with a pressure compensator. Taken as a whole, the subject matter is not obvious because none of the patents used by Smith as examples of prior art involves a pressure compensator. Again, although Smith failed to meet its burden, the trial court ruled Patent '195 invalid, a mistaken and therefore clearly erroneous ruling.

Smith v. Hughes, 664 F.2d 1373 (9th Cir. 1982).

This does not mention the defense of anticipation, and the Court can only conclude that the arguments regarding anticipation were not considered by the Ninth Circuit. If they were considered, this Court strongly feels an error was committed in that case. In conclusion, the Court finds that the '195 patent is invalid because of lack of novelty. 35 U.S.C. § 102.

VI. *Findings of Fact*

1. Plaintiff Hughes Tool Company is a corporation of the state of Texas having a principal place of business in Houston, Texas. Hughes is engaged primarily in the business of manufacturing and selling equipment used in the rotary drilling industry, principally rotary rock bits.

2. Defendant Dresser Industries, Inc. is a corporation of the state of Delaware having a regular and established place of business within this district. Dresser, through its Security Division, designs and sells rotary rock bits used in the oil and gas drilling business.

3. This action was filed in 1976 for infringement of United States Patent Nos. 3,397,928 and 3,476,195. Plaintiff Hughes is the owner of these two patents, and has charged Defendant Dresser with infringement by reason of its manufacture and sale of rock bits which incorporate the inventions claimed in those patents. Dresser has answered, denying infringement and interposing affirmative defenses challenging the validity and enforceability of those patents. Dresser has also asserted a counterclaim seeking a declaration that the '928 and '195 patents are not infringed and are invalid and unenforceable.

The '928 patent, issued on August 20, 1968, upon the application of Edward Galle, is directed to a seal for use in a rolling cutter rock bit, the seal having only a single distinguishing characteristic—upon installation in the rock bit, the seal is "compressed by not less than substantially ten percent of its thickness prior to assembly." (See PX 1, claim 1.)

5. The modern rock bit weighs up to several hundred pounds and costs up to several thousand dollars—depending upon size and type. During its drilling life, it is subjected to extraordinary conditions. While being turned from about 30 to 300 rpm, the bit is subjected to a mechanical loading against the bottom of 15-40 tons or more. When at a depth of two, three or even five miles, the downhole temperatures will often be as high as 400° F, and the hydrostatic pressure from the column of drilling fluid may be as high as 15,000 psi. The drilling fluid, which becomes extremely abrasive as it blasts and picks up rock grit from the bottom, is jetted through and

around the bit at a rate as high as 200 to 500 gallons per minute.

6. The first rolling cutter rock bits dating from 1909 utilized journal or friction bearings. They were unsealed against grease loss and the intrusion of abrasive drilling fluid. Lubrication for the journal bearing was provided from a long lubricator sub-assembly which extended from the top of the bit up many feet into the drill string. Grease flowed downward from the lubricator into the bearings and outward from the bottom of the bit. When the supply of grease was exhausted, it was necessary to pull the bit to the surface so as to refill the lubricator. Such unsealed, journal bearing bits were the industry standard until they were obsoleted in the 1930s by a wholly different type of bearing.

7. Beginning in the 1930's, the conventional rock bit had what is known as an "anti-friction" bearing, i.e., the inside of the conical cutter was separated from the shaft or axle by cylindrical, free-turning rollers. These "roller bearing bits" were not sealed from the outside environment. Nor was a supply of grease provided; gone were the old cumbersome lubricators. When such a bit was drilling, therefore, the abrasive drilling fluid around the bit was free to enter the bearings and circulate around the rollers. This practice was called "slush lubrication."

8. The first successful sealed bearing rock bit was invented at Hughes in the late 1950's. That invention was the subject of Hughes U.S. Patent 3,075,781, now expired. In essence, this first sealed bit utilized the conventional anti-friction roller bearing, an internal supply of grease, and the particularly designed seal of the '781 patent to segregate the lubricated bearing from the outside drilling fluid. This successful seal was quickly accepted by the industry and has come to be commonly known as the "Belleville," or "Standard" seal. Where a slush lubricated bit might have drilled for 20 hours, bits with the Belleville seal drilled 50 or 60 hours.

9. Edward Galle realized that the Belleville seal in a roller bearing bit was limited to 50 or 60 hours and turned his attention to the goal of attempting to seal a journal bearing bit in such a way as to obtain a 100-hour bit.

10. Tests by numerous rock bit engineers using journal bearing bits and Belleville seals were attempted. None of these produced a successful result.

11. Galle turned to what on the surface appears to be the simplest seal of all—the ordinary packing ring, or "O-ring," so called because of its cross-sectional shape.

12. At Hughes Tool Company, workers prior to Galle had experimented, without success, with sealing a rock bit bearing with O-rings. At the Turner Bit Company in Dallas, O-ring sealed bits were the subject of an issued patent and prolonged experimentation in the 1950's, which finally resulted in failure. Smith, in the early 1960's, instituted research programs based upon the use of O-rings and received a partial seal of rock bit bearings. None of these independent efforts was successful and all were abandoned.

13. The breakthrough came when Galle combined the O-ring seal with the journal bearing design in the particular manner which he teaches in the '928 patent. In doing so, Galle went contrary to the efforts which preceded him. Not only did he combine the O-ring and journal concepts, he positioned the O-ring in a groove directly in between the opposed and engaged bearing surfaces of the journal. And unlike his predecessors, he compressed or squeezed that O-ring by not less than 10% and preferably 15%, when the cutter was assembled on the bit shaft.

14. The reactions of Hughes' competitors, Dresser and Smith, to the introduction of the new journal bearing, O-ring sealed bits in 1969 is a tribute to the innovation

and achievement of Edward Galle. The reactions were nearly identical, moving from (1) initial alarm over the overwhelming success of the Hughes bits and fear of market share loss, (2) a rush to obtain and analyze the Hughes bits and to study the '928 and '195 patents, (3) skepticism that O-ring seals would ultimately prove more successful than Belleville seals, (4) skepticism that O-rings seals would perform satisfactorily when squeezed as much as taught by Galle, (5) the institution of high priority and rushed research efforts to develop a competitive bit which would avoid infringement of the '928 and '195 patents, and finally (6) overwhelming their skepticism and surrendering to competitive pressures by simply copying the patented features of the Hughes bits.

15. When rumors began to spread that Hughes had succeeded in attaining the 100-plus hour objective, and that the bearing life of rock bits had been doubled or tripled, consternation spread through the ranks of Hughes' competitors. A report in the Fall of 1969 noted a Hughes run of 220 hours and warned that the improvement in bearing life "appears to be 200 percent or more." (See PX 32, 34, 35.)

16. By the end of 1969, both Dresser and Smith had been able to obtain one of the experimental Hughes bits which had been run in the field. Each of those companies noted that the bit had a journal bearing, O-ring seals, and a pressure relief valve. The rumors of its outstanding performance were confirmed. The bits were scrutinized and subjected to a detailed dimensional and metallurgical analysis. The '928 patent was acquired and studied (PX 30, 31, 75).

17. The pressure on Hughes' competitors increased. A Dresser executive concluded ". . . we can expect to lose 50 to 65% of the monthly market. . . ." (Px 39).

18. Even after analyzing the used experimental Hughes bits which had been recovered from the field, and after studying the '928 and '195 patents, the engi-

neers at Dresser and Smith failed to discern any solution to the problem. In the first place, they were warned by their superiors to seek ways of avoiding infringement of the patents. But, more importantly, they disbelieved: they disbelieved that the solutions taught and claimed in the '928 and '195 patents were responsible for the outstanding successes being demonstrated by the journal bearing bits (P) x 75).

19. At Dresser, the effort to develop a bit which could compete with the Hughes journal bearing, O-ring sealed bits was given number one priority. "Task forces" of engineers were formed to attack the problem. Yet, many months were wasted because of a persistent skepticism that O-rings could be designed to effect a better seal than the standard Belleville seal with its years of proven success. Apparently, O-rings were "not well thought of in the industry at the time." In any event, for some period, the attention of Dresser engineers was distracted from O-ring seals, and experiments with journal bearing designs having Belleville seals were pursued (PX 69).

20. At Smith, the skepticism took a somewhat different tack. The problem of designing a competitive bearing and seal was assigned to William Robinson, a former O-ring engineer with the Parker Seal Company who had spent most of his 30-year professional life in the design of rock bits and bearing seals (PX 75).

21. When Robinson first examined the new Hughes journal bit and studied the '928 and '195 patents, he disagreed with Galle's teaching that the O-ring should be mounted between the opposed journal bearing surfaces in such a manner that it would be squeezed *not less than* 10% and preferably from 15 to 20%. Based upon his experience with O-rings and rock bit bearings, Robinson believed that 10% was the *maximum* squeeze which could be tolerated. Robinson's conviction that the lesser squeeze would give longer life was so firm that, in the summer of 1970, he applied for a United States Patent based upon that premise (PX 13, 75).

22. As the year 1970 progressed, men from both companies continued to be plagued by this skepticism of Galle's teachings. Their development attempts suffered for it. And, despite the priority given to this independent effort to find a satisfactory solution to the problem, the engineers were unable to create a competitive bit. Their designs were finally abandoned, and they decided to copy the Hughes bit (PX 75).

23. The principle items of prior art to the '928 patent are the catalogs of O-ring manufacturers which give customers basic O-ring design instruction, the various patents involving seals for rock bits, and additional articles involving O-rings. The O-ring catalogs and additional articles before the Court each, in varying degrees, warned that when an O-ring was considered for a rotary application, high temperatures, high speed rubbing surfaces, abrasive fluids and high diametrical clearances were to be avoided.

24. Each of these forbidden conditions is necessarily encountered by a rock bit which is designed to drill in high ambient temperatures up to 400° F, to operate with additional heat generating surface rubbing speeds of 300-400 feet per minute, to perform in an environment where the seal is directly exposed to highly abrasive drilling fluid, and to withstand large bearing clearances and cutter wobble necessary to accommodate the rolling and crushing action under many tons of weight.

25. If, despite the warnings of O-ring manufacturers, an O-ring were to be used in a rock bit, the catalogs suggest that the O-ring not be placed in or near the bearing surfaces which themselves generate additional local heat, and that the O-ring must be squeezed only slightly, i.e., below a minimum of 10%, in order to permit operation at the lowest possible heat and load.

26. The patents before the examiner and the additional patents before this Court reveal prior art which differs from the '928 patent. All such prior art in no

place teaches that an O-ring seal should be squeezed at least 10% when used in a rock bit.

27. Testimony by rock bit engineers as to their reactions to the '928 patent in the late 1960's and early 1970's reveals that the patent would not have been obvious to a person having ordinary skill in the art of designing rock bits. There existed a strong incentive to invent such a seal for a journal bearing bit, and efforts to do so were made both with Belleville seals and O-rings. Such efforts were unsuccessful until Galle's invention. Even after the '928 patent produced commercial success, these rock bit engineers expressed doubts that the 10% squeeze was the reason for the good results.

28. Secondary considerations such as skepticism of the experts, commercial success, long felt but unsolved needs, the failure of others, and eventual copying by others all support the Court's finding of unobviousness of the '928 patent.

29. Defendant, Dresser, has manufactured within the United States rock bits of various sizes and cutting structures having, in common, journal or friction bearings which, in combination with an O-ring, provide a seal means to prevent outward leakage of grease from the bearings and inward intrusion of drilling fluid to the bearings. Such bits have been sold by Dresser within the United States and in foreign countries. They are designated by Dresser through use of letters and numerals followed by the suffix "F", e.g.,

S33SF	S86F	S33F
S44F	S88F	M90F
M44NF	M84F	H84F
M44LF	M88F	H99F
H77CF	M89TF	M88G
S84F	M89F	H100F

(PX 17, 18, 20)

30. Dresser is charged with having infringed claims 1 through 4 and 7-10 of the '928 patent by reason of its manufacture and sale of the above identified bits. Claim 1 is illustrative:

> Seal means for drill bit bearings, said seal means comprising: a shaft rigidly secured to a drill bit body and having a bearing surface formed thereon; a cutter element rotatably mounted to said shaft and having a bearing surface thereon that opposes and engages the bearing surface on said shaft, one of said surfaces having a circumferential groove therein; and a resilient packing ring positioned within said groove, with said packing ring, said groove and an opposing surface being sized such that upon assembly of the cutter element upon the shaft the cross sectional thickness of said ring is compressed by not less than substantially ten percent of its thickness prior to assembly of the cutter element upon the shaft.

Others of these claims cover various embodiments of Galle's discovery including the durometer hardnes of the O-ring compound being not substantially over 70, a squeeze on the O-ring of 15% or more, the inclusion of a lubricant reservoir and pressure compensator, and an O-ring whose thickness is not less than 2% of the drill bit diameter (PX 1).

31. The above identified bits of Dresser respond literally and in substance to one or more of the claims of the '928 patent. Each utilized journal bearings wherein bearing surfaces on the shafts of the bit opposed and engaged bearing surfaces of the cutter elements, and in one of such surfaces a circumferential groove was provided to accommodate a resilient packing ring, i.e., an O-ring. The depth of the groove and the opposing surface were sized such that upon assembly of the cutters on the shafts the cross sectional thickness of the O-rings were com-

pressed or squeezed by not less than 10% of their relaxed thickness. (PX 17, 18, 20, 21, 69, 70, 72, 119)

32. The seal means including the journal bearing and O-ring utilized in the above identified Dresser bits performs substantially the same function in substantially the same way to obtain the same result as does the structure described and claimed in the '928 patent (PX 17).

33. Dresser has infringed the '928 patent of Hughes. During its fiscal years 1973 through October 31, 1982, Dresser sold 129,762 infringing rock bits for the sum of $343,354,994 (PX 81, 20, Responses to Interrogatories 59-63).

34. All of the infringing bits were manufactured within the United States. They were sold in the United States and in the export markets (PX 81).

35. Dresser sold the infringing bits in each of the two principal rock bit product markets or market segments, i.e., the insert bit market and the steel tooth bit market. The insert bit market comprises rock bits which have tungsten carbide cutting inserts embedded into the cones. These inserts are extremely hard and durable. Their useful life far exceeded the 50-60 hour life of the Belleville seal roller bearing bits and their potential was not fully realized until the development of the journal bearing bits of the patents in suit.

The other market in which Dresser used the inventions comprised rock bits having steel teeth as cutting elements. These teeth are milled into the body of the cutting cone. Steel tooth bits are principally used to drill shallow wells or the upper portions of deeper wells (PX 85).

36. Quantitatively, Dresser's infringing sales volume and sales revenue from rock bits embodying the '928 patent in each of the product and territorial market areas were:

Type	Units	Revenue
a. Insert journal bearing bits made and sold in the United States	93,648 units	$265,528,279
b. Insert journal bearing bits made in the United States and sold abroad	19,095 units	$ 59,310,210
c. Steel tooth journal bearing bits made and sold in the United States	14,254 units	$ 15,257,493
d. Steel tooth journal bearing bits made in the United States and sold abroad	2,765 units	$ 3,259,012
TOTAL:	129,762 units	
TOTAL REVENUES:		$343,354,994

37. As damages to compensate for the infringement, Hughes seeks the profits it would have made from sales of the insert journal bearing bits to customers within the United States had Dresser not made the infringing sales. Hughes has not carried its burden of proof with regard to this issue. There was strong customer demand for these patented bits and the demand was for the advantages offered by the patented bits. No acceptable non-infringing alternatives for the patented insert journal bearing bits existed. However, the Court notes that Hughes could not meet its own customer demand on occasion and the Court is not convinced that Hughes had the manufacturing and marketing capability to exploit the demand for patented bits which had resulted in the infringing sales to Dresser. Also, the Court finds Hughes' evidence regarding the profits it would have made on the additional infringing sales to be too speculative to support an award of lost profits.

38. As damages adequate to compensate for the infringing sales where "lost profits" were not proved, Hughes seeks not less than a reasonable royalty. To ascertain the reasonable royalty, this Court applies the "willing buyer-willing seller" rule. In doing so, the Court first determines the bargaining posture of the parties at the time the infringement began, i.e., their expectations of profit, and related factors. From this

posture, the Court determines that reasonable amount which Hughes and Dresser probably would have agreed upon had they been acting reasonably and prudently in voluntarily trying to reach an agreement.

39. Dresser's infringement began in 1973. At that time, Dresser knew that the performance of insert type rock bits with the patented features was substantially greater than the performance of insert bits with Belleville sealed roller bearings. Dresser had recognized a significant need to manufacture a rock bit which would be competitive in the market place to the Hughes insert journal bearing bit. This need is manifested by Dresser's futile research efforts to develop a non-infringing bit and by its concern that it might lose a large share of the market for insert roller bearing bits to Hughes' journal bearing bits. As an existing manufacturer of rock bits, Dresser possessed most of the plant and sales capacity necessary to manufacture and sell the patented rock bits. This existing capacity, together with the improved and known performance of the patented rock bits, eliminated any substantial business risk from the purchase of a license. Dresser projected 60% projects on the sale of bits with the '928 seal.

40. In 1973, Hughes did not want to license its direct competitors to use the '928 patent. It was well aware of the growing customer demand for its patented bits and that the advantages of those bits meant there were no acceptable non-infringing alternatives at that time. The superiority of the Hughes bits was a result of the '928 patented seal, and no other factors such as "price reliability, versatility, service after sale, [or] company reputation" caused the increased customer demand for those bits. *Hughes v. Murphy* at 929. On the other hand, in 1973, Hughes did not believe the demand for roller bearing bits would decrease as rapidly as it did and Hughes was expecting to see a competing bit with performance on par with it's '928 bits at any time (PX-111, DX-

XXX). Hughes suggests it realized profits of 49% and 54% on its '928 bits sold in the United States and abroad.

41. The drill bit is a combination of numerous parts, some patented, all of which contribute to its total value.

42. Under the hypothetical negotiations, it is reasonably probable that Hughes and Dresser would have agreed upon a royalty rate of 25% for the '928 patent used in insert journal bearing bits. This figure would still have allowed Dresser to realize a large profit on its sales of the bits.

43. The '928 patent did not contribute as greatly to the value of steel tooth journal bearing bits as it contributed to the insert journal bearing bits. Also, profits on the steel tooth bits were considerably smaller than on the insert journal bearing bits. Thus, the Court finds the '928 patent contributed only 5% of the total value of the steel tooth journal bearing bits and it is reasonably probable that the parties would have agreed to a 5% royalty in the hypothetical negotiations in 1973.

44. The Court finds that, in view of interest rates of 8.49% to 15.29% during the years 1973 through 1983, a prejudgment interest rate of 10% is appropriate in this case.

45. The Court finds that it should not increase damages in this case. Although Dresser deliberately copied the ideas of Hughes in the '928 patent, it had reasonably investigated the scope of the patent and had formed a good faith belief that the patent was invalid. Also Dresser's behavior during litigation would not warrant increased damages. The entire issue involving the patentability of a minimum 10% squeeze on an O-ring seal in rock bits is, at least, debatable, and this Court will not increase damages.

46. The '195 patent is invalid in light of the Parks patent, which included all of the same elements, com-

bined in the same way, performing the same functions. Although there is a presumption for validity accorded to a patented invention, that presumption falls away if "more pertinent" prior art is shown to the Court than was before the PTO during the prosecution of the application. That is the case here, where neither the examiner nor Hughes appeared to be aware of the Parks patent during the prosecution. Both the '195 patent and the Parks patent performed the functions of providing pressure relief valves in rock bits for those situations in which the pressure rises. The '195 patent is invalid for lack of novelty. 35 U.S.C. § 102.

47. Any finding of fact which should be a conclusion of law is hereby made a conclusion of law.

VII. *Conclusions of Law*

1. This Court has jurisdiction of the subject matter of this action under 28 U.S.C. § 1138. Venue is proper in this Court and has not been contested.

2. Each of the Galle patents, 3,397,928 and 3,476,195 are presumed by statute to be valid. 35 U.S.C. § 282.

3. The presumption that the '928 patent is valid is further strengthen by the adjudication of that patent in *Smith International v. Hughes Tool*, 664 F.2d 1373 (9th Cir. 1982) and by the fact that the same prior art here urged by defendant was before the courts of the Ninth Circuit. [*RCA v. Radio Engineering Labs*, 293 U.S. 1, 10 (1934); *Robertson Rock Bit Co. v. Hughes Tool*, 176 F.2d 783, 790 (5th Cir. 1949).]

4. The Patent Office Examiner considered prior art which was either comparable to, or more pertinent than, prior art now urged by defendant, and granted the patents over such prior art. [*Gore v. Garlock*, Appeal No. 83-613/614, U.S. Ct. of Appeals for Federal Circuit, November 14, 1983; *Ingersoll-Rand v. Brunner & Lay*,

Inc., 474 F.2d 491, 496 (5th Cir. 1973); *Hobbs v. United States*, 451 F.2d 849, 863 (5th Cir. 1971).]

5. The defendant has not sustained its burden of proving that the invention as a whole of the '928 patent would have been obvious, at the times the inventions thereof were made, to a person having ordinary skill in the rock bit art pursuant to 35 U.S.C. § 103. [*United States v. Adams*, 383 U.S. 39 (1966); *Gore v. Garlock*, Appeal No. 83-613/614, U.S. Ct. of Appeals for Federal Circuit, November 14, 1983; *Control Components v. Valtek Inc.*, 609 F.2d 763 (5th Cir. 1980); *Ingersoll-Rand v. Brunner & Lay*, 474 F.2d 491, 496-497 (5th Cir. 1973); *Hobbs v. United States*, 451 F.2d 849, 864 (5th Cir. 1971).]

6. Having failed in its burden of proof, defendant's defense to the validity and enforceability of the '928 patent is overruled, the presumption of validity is sustained, and the '928 patent is declared valid and enforceable.

7. Plaintiff Hughes has sustained its burden of proving that Dresser has infringed one or more claims of the '928 patent. [*Graver Mfg. Co. v. Linde Co.*, 339 U.S. 605 (1950); *Ziegler v. Phillips Petroleum*, 483 F.2d 855 (5th Cir. 1973); *Harrington Mfg. Co. v. White*, 475 F.2d 778 (5th Cir. 1973).]

8. Title 35, United States Code, Section 284 is the statutory basis for an award of damages in a patent infringement action. It provides:

> Upon finding for the claimant, the court shall award the claimant damages adequate to compensate for the infringement but in no event less than a reasonable royalty for the use made of the invention by the infringer, together with interest and costs as fixed by the court.
>
> When the damages are not found by a jury, the court shall assess them. In either event the court

may increase the damages up to three times the amount found or assessed.

The court may receive expert testimony as an aid to the determination of damages or of what royalty would be reasonable under the circumstances.

Damages under this statute has been defined as compensation for the pecuniary loss the patentee has suffered without regard to the infringer's profit or loss. *Aro Mfg. Co. v. Convertible Top Co.*, 377 U.S. 476, 507 (1964). Where the patentee elects to manufacture the patented product without competition, his compensation is the profits he would have made on the sales taken by the infringer. *Yale Lock Co. v. Sergent*, 117 U.S. 536, 552 (1886), *Livesay Window Co. v. Livesay Industries*, 251 F.2d 469, 471 (5th Cir. 1958). Where lost profits cannot be proved, the compensation for the loss is not less than a reasonable royalty. *Panduit Corp. v. Stahlin Bros. Fibre Works*, 575 F.2d 1152, 1157 (6th Cir. 1978).

10. In order to obtain an award of lost profits, the patent owner has the burden to demonstrate that, in all reasonable probability, he would have made the sales which the infringer made. *Hughes Tool Co. v. G. W. Murphy Industries, Inc.*, 491 F.2d 923, 925 (5th Cir. 1973) *Livesay Window Co. v. Livesay Industries, Inc.*, 251 F.2d 469, 471 (5th Cir. 1958). This ultimate fact question is satisfied by a showing of (1) demand for the patented product, (2) the absence of non-infringing alternatives, (3) the patentee's marketing and manufacturing capability to supply the demand and (4) the amount of the lost profits. *Panduit Corp. v. Stahlin Bros. Fibre Works, Inc.*, 575 F.2d 1152, 1156 (6th Cir. 1978).

11. Although there was strong demand for the '928 bits and there were no acceptable, non-infringing alternatives, Hughes has not met its burden of proof with respect to showing its capability to supply the demands nor with respect to the amount of lost profits. The esti-

mates by Hughes of lost profits are based on too much speculation to support an award of lost profits. *Livesay Window Co. v. Livesy Industries, Inc.*, 251 F.2d 469, 471 (5th Cir. 1958).

12. A reasonable royalty is determined by resorting to hypothetical license negotiations and determining the royalty rate which the infringer would have paid and which the patentee would have accepted if each had been acting reasonably and prudently in trying to reach an agreement. *Horvath v. McCord Radiator and Mfg. Co.*, 100 F.2d 326, 335 (6th Cir. 1938), *Georgia-Pacific Corp. v. U.S. Plywood-Champion Papers Inc.*, 446 F.2d 295, 296 (2nd Cir. 1971).

13. The suppositious negotitions are presumed to have taken place before the infringement began. *Georgia-Pacific Corp. v. U.S. Plywood-Champion Papers, Inc.*, 446 F.2d 295, 296 (2nd Cir. 1971), *Panduit Corp. v. Stahlin Bros. Fibre Works, Inc.*, 575 F.2d 1152, 1158 (5th Cir. 1978).

14. The reasonable royalty is to be determined on the hypothesis that the patents in suit were valid and would be respected. *Trio Process Corp. v. L. Goldstein's Sons, Inc.*, 553 F.2d 126, 129 (3rd Cir. 1976).

15. In determining the royalty rate at which the parties would have agreed, consideration is given to the nature of the inventions, their utility, benefits and the extent of use involved, *Dowagiac Mfg. Co. v. Minnesota Moline Plow Co.*, 235 U.S. 641, 648 (1915), and to the relationship between the parties, their commercial situation, and the expected profits from the use of the invention. *Ergy Register Co. v. Standard Register Co.*, 23 F.2d 438, 443 (6th Cir. 1928), *Georgia-Pacific Corp. v. United States Plywood Corp.*, 318 F. Supp. 1116, 1120 (D.C.N.Y. 1970), *Panduit Corp. v. Stahlin Bros. Fibre Works Corp.*, 575 F.2d 1152, 1158 (6th Cir. 1978). Of these various considerations the expected profit from

making and selling the patented invention is the primary consideration. *Georgia-Pacific Corp. v. U.S. Plywood Corp.*, 318 F. Supp. 1116, 1122 (D.C.N.Y. 1970).

16. Where more than one patent is involved, consideration should be given to the relative values of the patents, to the degree to which each invention contributed to the marketability and profitability of the product and to whether the patent was for a new combination or an improvement, *Crosby Valve Co. v. Safety Valve Co.*, 141 U.S. 441, 454 (1891), *Stromberg Motor-Devices Co. v. Zenith-Detroit Corp.*, 73 F.2d 62, 63 (2nd Cir. 1934), *Georgia-Pacific Corp. v. U.S. Plywood Corp.*, 318 F. Supp. 1116, 1120 (D.C.N.Y. 1970).

17. Consideration should not be given to royalties negotiated under other license agreements except to the extent such agreements are directed to comparable inventions; to comparable commercial situations; and tend to prove an established royalty rate for the patents in suit. *Faulkner v. Gibbs*, 199 F.2d 635 (9th Cir. 1952), *Georgia-Pacific Corp. v. U.S. Plywood Corp.*, 318 F. Supp. 1116, 1120 (D.C.N.Y. 1970).

18. Prejudgment interest should be awarded under 35 U.S.C. § 284 unless there is some justification for withholding such an award. *General Motors Corp. v. Devex Corp.*, —— U.S. —— (1983).

19. A patentee whose patent has been sustained is entitled to enforcement of his exclusive right by an injunction. 35 U.S.C. § 283.

20. The defendant has sustained its burden of proving that the invention of the '195 patent was anticipated by another patent (the Parks patent) pursuant to the provisions of 35 U.S.C. 102. *Coffin v. Ogden*, 85 U.S. 120, 124 (1873); *United States v. Adams*, 383 U.S. 39, 150 (1966); *McCullough Tool v. Well Surveys, Inc.*, 343 F.2d 381, 399 (10 Cir. 1965); *Robertson Rock Bit v. Hughes Tool*, 176 F.2d 783, 789 (5th Cir. 1949).

21. Any conclusion of law which should be a finding of fact is hereby made a finding of fact.

Plaintiff, Hughes, shall submit a proposed judgment consistent with the findings of fact and conclusions of law herein. The parties shall confer with respect to the quantity of infringing sales and manufacture subsequent to October 31, 1982, and if a stipulation can be made as to that quantity, damages therefor shall be included in the proposed judgment.

Signed this 6 day of February, 1984.

/s/ Eldon B. Mahon
ELDON B. MAHON
United States District Judge

APPENDIX C

APPENDIX C

UNITED STATES COURT OF APPEALS
FOR THE FEDERAL CIRCUIT

Appeal Nos. 85-2471
and 85-5202

HUGHES TOOL COMPANY,
Appellee, Cross-Appellant,

v.

DRESSER INDUSTRIES, INC.,
Appellant, Cross-Appellee.

JUDGMENT

On Appeal from the United States District Court
for the Northern District of Texas
in Case No(s). 4-76-53-E

This CAUSE having been heard and considered, it is

ORDERED and ADJUDGED:

AFFIRMED IN PART, VACATED IN PART, AND REMANDED

ENTERED BY ORDER OF THE COURT
/s/ Francis X. Gindhart
FRANCIS X. GINDHART
Clerk

Dated Apr. 13, 1987

Issued as Mandate: May 26, 1987

APPENDIX D

APPENDIX D

UNITED STATES COURT OF APPEALS
FOR THE FEDERAL CIRCUIT

Appeal Nos. 85-2471
85-2502

HUGHES TOOL COMPANY,
Appellee, Cross-Appellant,

v.

DRESSER INDUSTRIES, INC.,
Appellant, Cross-Appellee.

Before FRIEDMAN, RICH, *Circuit Judges,* COWEN, BENNETT,* *Senior Circuit Judges,* and NIES, *Circuit Judge.*

ORDER

Petitions for rehearing having been filed by the appellant and cross-appellant,

UPON CONSIDERATION THEREOF, it is

ORDERED that the petitions for rehearing are denied.

FOR THE COURT

By /s/ Diane Frye
Chief Deputy Clerk
FRANCIS X. GINDHART
Clerk

5-19-87
Date

cc: Mr. John F. Lynch
Mr. Britton A. Davis

---

* The Honorable Marion T. Bennett assumed senior status on March 1, 1986.

APPENDIX E

APPENDIX E

IN THE UNITED STATES COURT OF APPEALS
FOR THE FEDERAL CIRCUIT

Appeal Nos. 85-2471 and 85-2502

DRESSER INDUSTRIES, INC.,
Appellant, Cross-Appellee,

v.

HUGHES TOOL COMPANY,
Appellee, Cross-Appellant.

MOTION TO REMAND, TO VACATE, OR TO REOPEN THE RECORD, OR OBTAIN RELIEF FROM JUDGMENT

Appellant, Dresser Industries, Inc. ("Dresser"), respectfully moves the Court to remand this case to the District Court for consideration of new evidence which justifies vacating the District Court's judgment of validity of the '928 patent. As grounds for its motion, Appellant would show the Court:

1. New evidence has only recently been discovered by Dresser, such new evidence repudiates the integrity of the arguments advanced by Hughes regarding the high speed and high temperature capability of the '928 patent seal.

2. The new evidence confirms the deliberate scheme on the part of Appellee, Hughes Tool Company ("Hughes"), to mislead this Court and other

courts as to the basis of patentability of the Hughes '928 patent.

3. The new evidence is a document identified as Exhibit 8565 in the related case, *Smith International, Inc. v. Hughes Tool Company*, Consolidated Appeals Nos. 86-1139 and 86-1225. The document was withheld from Dresser by Hughes despite its compelling relevance to the issues presented to the District Court. Overall, Hughes has engaged in a willful scheme of misconduct by concocting and urging upon this and other courts false theories of patentability in a fashion which rises to the level of fraud on the court.

4. When viewed in light of the newly discovered document, the arguments advanced by Hughes in support of its positions on patentability of the '928 patent and functional capability of the '928 patent seal are nothing less than a deliberate recasting of determinative facts. The withholding of this document and the information included therein amounts to fraud on the court.

Appellant hereby moves this Court to remand the captioned appeal to the District Court for a new trial or for amendment of the District Court's Amended Judgment under Rules 59 and 60, Fed.R.Civ.P.

Appellant further requests that if this motion is remanded to the District Court for consideration of Rule 60(b) issues, the Order remanding this appeal provide that Appeals Nos. 85-2471 and 85-2502 may be reinstituted in this Court without the necessity to perfect a new appeal.

Respectfully submitted,

/s/ John F. Lynch
JOHN F. LYNCH
ARNOLD, WHITE & DURKEE
One Bering Park
750 Bering Drive, Suite 400
Houston, Texas 77057
(713) 787-1400
Attorneys for
Appellant, Cross-Appellee

Of Counsel:
M. SCOTT NICKSON, JR.
EDWARD G. FIORITO
DRESSER INDUSTRIES, INC.
1600 Pacific
Dailas, Texas 75201

IN THE UNITED STATES COURT OF APPEALS
FOR THE FEDERAL CIRCUIT

Appeal Nos. 85-2471 and 85-2502

DRESSER INDUSTRIES, INC.,
Appellant, Cross-Appellee,

v.

HUGHES TOOL COMPANY,
Appellee, Cross-Appellant.

MEMORANDUM IN SUPPORT OF MOTION TO REMAND, TO VACATE, OR TO REOPEN THE RECORD, OR OBTAIN RELIEF FROM JUDGMENT

I. INTRODUCTION

Appellant, Dresser Industries, Inc. ("Dresser") respectfully moves the Court to remand this case to the District Court for consideration of new evidence which should compel the District Court to vacate its judgment of *validity* of the '928 patent. The present case is under advisement, having been argued in January 1986. The new evidence is a Hughes-generated document which has been only recently discovered by Dresser.

On November 17, 1986, Dresser became aware for the first time of Exhibit 8565 which appears at pp. 1564-1568 of Volume V of the Appendix submitted in the appeal of the related case, *Smith International, Inc. v. Hughes Tool Company*, Consolidated Appeals Nos. 86-1139

and 86-1225. The Smith case is scheduled for hearing at 10:00 a.m. on December 1, 1986.

Exhibit 8565 had never before been produced to Dresser by Hughes despite multiple direct requests for documents of such content. Exhibit 8565 establishes that the entire notion that the '928 patent provides a seal design for a high speed/high temperature drill bit is nakedly untrue. Nonetheless, an alleged high speed and high temperature capability of the '928 patent seal was foisted by Hughes on the District Court below. Now Hughes is attempting to foist the same falsehood on this Court. Prepared in 1973, Exhibit 8565 [1] makes clear that, even 8 years after Mr. Galle filed his patent application, high speed operation was not achievable in bits using the seal of the '928 patent:

> The current existing [as of 1973] journal bearing design are limited to the lower range rotary speeds (up to 70) for economic application. *A drastically reduced bearing capacity is encountered as rotary speeds exceed 100 rpm.* The development of a journal bearing which will sustain higher rotary speeds in the range of 90-100 rpm would promote the application of the J-22 design. In addition, a 10-150 rpm bearing capability is a prerequisite for introduction of [new bit designs designed for soft formations]. [Emphasis added]

[Tab A, p. 1566]

Elsewhere, Exhibit 8565 addresses the inability of O-ring sealed bits to function in high temperature boreholes:

> Material now used in journal bearing seal systems is limited in regard to its ability to withstand temperatures in excess of 300°F±50°F. Bit life is limited

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[1] The relevant portions of Exhiibt 8565 are attached at Tab A.

by bearing failure. The problem of seals being affected by temperatures exists in some deep holes drilled with mud, in most holes drilled with air and all holes drilled in geothermal exploration.

[Tab A, p. 1567-68]

Thus high speed and high temperature drill bit operation were no part of the Galle '928 patent. Yet Hughes has concocted and urged such false theories of patentability on this and other courts. That misconduct has so pervaded the litigations involving the '928 patent that it rises to the level of fraud on the court. *United Business Communications, Inc. v. Racal-Milgo, Inc.*, 591 F. Supp. 1182, 1184 (D. Kan. 1984).

II. PROCEDURAL BASIS FOR THIS MOTION

Dresser is moving before this Court because the District Court has been divested of jurisdiction, and is presently without power to grant relief under either Rule 59 or Rule 60, Fed.R.Civ.P. Those two Rules provide alternative procedural grounds for District Court review in the event of remand.

The judgment which is the subject of the present appeal by Dresser is not *final* for all purposes. There remain accounting matters to be determined at the District Court following this appeal. In fact, paragraph IX of the Amended Judgment entered March 11, 1985, from which Dresser has appealed, expressly acknowledges that the Amended Judgment is not yet "final." [A 107.] [2] Therefore, Dresser believes it may seek a new trial or amendment of the Amended Judgment from the District Court in the event of remand under Rule 59, Fed.R.Civ.P.

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[2] Reference in this Memorandum to the Joint Appendix already filed in the present appeals is made by "A.——" followed by the page number in that Joint Appendix.

However, should this Court deem that the Amended Judgment of March 11, 1985 is a final judgment despite its terms, Dresser believes that its motion for relief from the Amended Judgment may be considered by the District Court under the appropriate provisions of Rule 60(b), Fed.R.Civ.P.

III. EXHIBIT 8565 CONTAINS CRUCIALLY IMPORTANT EVIDENCE

The new evidence, Exhibit 8565, conclusively establishes that high speed and high temperature capability form no part of the invention of the '928 patent. That issue had impact on this case as well as upon the prior Ninth Circuit decision which strongly influenced the result in this case.

A. *Exhibit 8565 Proves That High Speed and High-Temperature Operation Are Not Achieved By The '928 Patent Seal*

Exhibit 8565 is aparently an outline of "field requirements," that is, a definition of product requirements, formulated as a result of a conference of Hughes' field representatives in the year 1973. The document had wide circulation to Mr. Galle, the inventor, as well as other Hughes employees who testified in this case.

At p. 1566 under the title of "High RPM Journal Bearing," the document acknowledges that the Hughes bearing design of 1973 was "limited to the lower range of rotary speeds (up to 70) for economic application," and that "drastically reduced bearing capacity is encountered as rotary speeds exceed 100 rpm." [Tab A, p. 1566]. These graphic factual admissions are entirely in accord with Dresser's position on the bit speed issue, and foreclose the notion that Galle created a high speed bit.

Limitations as to the temperature tolerance of the bit in 1973 recognized at pp. 1567-68 of Exhibit 8565 fully

refute Hughes' suggestion that Galle was successful in providing a bit which could tolerate 400°F. [Tab A, p. 1567-68.]

B. *The New Evidence Is Important To The Issues Raised In The Present Appeal*

A transcript of the argument at the hearing in the instant appeal[3] reveals an exchange between Hughes' counsel and a member of this Court which proves the importance of the speed and temperature issues to the issues of patentability involving the '928 patent:

> JUDGE NIES: Do you think temperature, speed are important considerations in this case; yes, or no?
>
> Mr. Davis [Hughes' counsel]: Yes. [Tab B, p. 59]

In Hughes' brief on the present appeal (see Brief for Appellee at page 23-24), Hughes argues:

> *Dresser's attempt to deprecate the high speed conditions is not conducive to long 100-hour bit life is equally frivolous.* Obviously, when the drilling conditions permit, higher rotary speeds also yield higher penetration rates. But of course, the cutting structure on the bits also wears out faster. In the bits of Galle's invention, what ever the rotary speed, it was normally the cutting structure which failed first. The bearings and seals "endure" [citation to record omitted].

The speed and temperature issues were injected in the case by Hughes at the District Court level as conditions which supposedly would have deterred those of ordinary skill from using more than 10% squeeze on an O-ring to make a drill bit bearing seal. The District Court below indicated that it was required to "address the threshold

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[3] That transcript was made by a court reporter with the permission of this Court when this case was argued. An excerpt of the relevant part of that transcript is submitted at Tab B.

issue of whether rock bit seals must withstand the effects of high speeds and high temperatures." [A. 50] The District Court went on to conclude that rock bit bearings are in fact run under high speed and high temperature rotary conditions and that Galle was required to design for such conditions. [A 50-51]. Specific numbered findings 23 and 24 entered by the District Court, and copied virtually verbatim from proposed findings of Hughes, further emphasized the supposed non-obviousness of the '928 patent seal because the art "warned" about "forbidden" high speed and high temperature conditions for O-ring use. [A. 90-91].

In fact, high speed/high temperature operation was never an attribute of Galle's invention. But the speed and temperature issues had been concocted originally by Hughes counsel when the earlier *Smith* case was before the Ninth Circuit. At that point, a strawman was needed to overcome the District Court holding that the '928 patent was invalid for obviousness.

IV. HUGHES HAS BEEN EMBARKED ON A CAMPAIGN TO MISLEAD COURTS AS TO THE NATURE OF THE '928 PATENTED INVENTION

A. *Hughes Argued A False Capability Of Its Bits To Operate At High Speeds And High Temperature Before The Ninth Circuit*

The California district court, which originally held the '928 patent invalid for obviousness, found enroute to that decision that "most if not substantially all sealed bearing rock bits . . . are run at speeds below 200 fpm." During the appeal in *Smith International, Inc. v. Hughes Tool Co.*, 664 F.2d 1373, 215 U.S.P.Q. 592 (9th Cir. 1982), Hughes argued that finding was "clearly erroneous and very misleading." [Hughes' Brief for Appellant

before 9th Cir. at p. 30]. Hughes alleged to the Ninth Circuit that drill bits had to be designed to operate in forbidden conditions of temperatures up to 400°F and "heat generating surface rubbing speeds of 300-400 feet per minute." [*Id.* at 29]. Hughes cited conditions of speed that Galle "had to design for" [*Id.* at 30] knowing full well that Galle's design was totally incapable of functioning at such high speeds.

In its Reply Brief of Appellant before the Ninth Circuit, Hughes forsook mere advocacy and entered the realm of naked misrepresentation:

> Another fundamental error [of Smith's argument] is in urging that a rock bit designer would design for low rpm operation and hence, a low surface speed (fpm) at the seal. [Reply Brief at 9]
>
> In any event, as pointed out in our opening brief (p. 30), sealed bearing bits are run at speeds well above 200 fpm. [*Id.* at 10]
>
> In designing for surface speeds that will, under some conditions, exceed 200 fpm, indeed 300 fpm and 400 fpm, one would not turn to the Parker recommendations for reciprocating seals as Smith (p. 15) would have it. [*Id.* at 11]
>
> The O-ring in a rock bit, however, must survive temperatures of 400-500° F or higher. [*Id.* at 13]
>
> The Patent Office Examiner is said to have been misled because Hughes did not tell him that surface speeds under 200 fpm were involved. As pointed out earlier, appreciably higher surface speeds are involved. Hughes knew this and had to design for it. [Citations omitted.] [*Id.* at 16-17]

Unfortunately, the Ninth Circuit Court of Appeals bought Hughes' story completely, and held that "[p]atent '928 was a combination patent comprised of several elements: an O-ring of specified hardness and squeeze used

in a journal as well as a roller bearing under high speed and high temperature rotary conditions." 664 F.2d at 1376, 215 U.S.P.Q. at 594.

The proposition is wholly fallacious. Had Hughes been forthright about the facts as recited in Exhibit 8565, the Ninth Circuit could have never reached such a conclusion. And whether nor not Hughes consciously concocted its story in ignorance of Exhibit 8565 during the Smith litigation, it is clear that they secreted the contents of that exhibit during this litigation. In this case, the speed and temperature issues were squarely in controversy, and documents relating to these issues were sought in discovery.

B. *Hughes Withheld Exhibit 8565 Despite Diligent And Explicit Requests To Produce Such Document*

Dresser's Request No. 53(b) to Hughes during the litigation below reads as follows:

> Identify and produce for Defendants' [Dresser's] inspection and copying all Hughes documents which contain, refer or relate to an objective of providing a sealed drill bit capable of operation at speeds in excess of 120 rpm.
>
> RESPONSE TO REQUEST 53(b):
>
> Plaintiff [Hughes] has previously produced its documents relating to the subject matter of this interrogatory.[4]

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[4] Request No. 53(b) was not the only request that encompassed Exhibit 8565. Dresser likewise requested "reports . . . and other documents relating to bearing failures and/or seal failures of Plaintiff's journal bearing rock bits. . . . Bit records and other documents . . . relating to or indicating operation of journal bearing bits at rotary speeds in excess of 100 RPM. . . . Documents containing or referring or relating to recommended speeds of rotation for journal bearing rock bits, whether prepared by Plaintiff or by others."

Needless to say, Exhibit 8565 was never produced by Hughes and only surfaced to Dresser's attention recently after it had been included in Volume V of the Appendix to the appeal in the Smith/Hughes litigation. The focus on the issue of bit speed in the litigation below precludes any inference that Hughes' failure to produce Exhibit 8565 was an oversight.

Dresser knew that the bit speed issue was a strawman when it argued to this Court at p. 14 of Dresser's Reply Brief:

> The bit speed issue was the fabrication of Hughes and Galle for the purpose of eliminating prior art.

But Dresser lacked the classic evidence provided by Exhibit 8565 to establish that Hughes' entire position with respect to bit speed was a bald faced untruth. That untruth was laid squarely on this Court's doorstep when Hughes argued in its brief before this Court:

> Dresser's attempt to deprecate the high speed conditions as not conducive to long 100-hour bit life is equally frivolous. [Hughes Brief, p. 23].

Hughes' campaign to establish bit speed as a design criterion met by Galle led to creating evidence as well. At trial, Hughes' counsel adduced the following testimony from Mr. Galle:

> Q. In your work, Mr. Galle, what account did you take of this wide range of rotary speeds?
>
> A. Well, I felt that if I was going to be successful in developing a bearing and seal combination that that bearing and seal would have to be capable of being used at this full range of operating practices.
>
> Q. Well, couldn't you have just designed the slow speed bit and told every user and purchaser of the bit to just turn it slowly?

A. I don't think that would be practical. We have no control over the way that a driller uses a bit. There are all types of drilling conditions and practices all over the world, and that just wouldn't have been a practical way to have approached it.

Q. Well, back at that time, did you believe that your journal bearing O-ring bits would come to be used in all sizes and types and operated over full ranges including all of these high speeds?

A. I certainly hoped it would.

Q. Well, has that come to be true?

A. Yes. [A. 2958-59]

Exhibit 8565 proves that the capability to achieve speed runs in excess of 100 rpm was not the product of Mr. Galle's invention. Rather to the meager extent that such operation may be possible, it was a product of developments which occurred after 1973.

As counsel for Hughes admitted before this Court, speed and temperature *are important issues* in this appeal. [Tab B, p. 59]. Exhibit 8565 dictates that those issues must be resolved *against Hughes.*

V. THIS COURT SHOULD REMAND THE CASE AND INSTRUCT THE DISTRICT COURT TO CONSIDER EXHIBIT 8565, ABSENT AN ALREADY FORMULATED DETERMINATION THAT THE '928 PATENT IS INVALID

The subject appeals involving Dresser and Hughes have been under advisement at this Court since the argument in January 1986. Unless this Court has already determined that the '928 patent is *invalid* based on Dresser's arguments presented at that time, the District Court should be given an opportunity to consider Exhibit 8565, and undertake whatever proceedings it deems appropriate

in order to amend its judgment in view of this new evidence.

A. *The Misconduct Of Hughes Rises To The Level Of Fraud On The Court Within The Meaning Of Rule 60, Fed.R.Civ.P.*

The attention of this Court is respectfully invited to the recent case of *United Business Communications, Inc. v. Racal-Milgo, Inc.*, 591 F. Supp. 1172, 224 U.S.P.Q. 148 (D. Kan. 1984). In that case, the plaintiff, United Business Communications (UBC), brought an independent action for relief from a judgment in Kansas in which a number of patents were found valid and infringed by UBC. The action was brought after litigations in other courts had established that the patentee had "concocted and successfully urged upon the Kansas court a theory of validity that it knew to be untrue." *Id.* at 1176, 224 U.S.P.Q. at 150-51. The Kansas court had been convinced that devices within one patent called the Whang '023 patent possessed "narrow skirted filters." It was later found "that the concept of narrow skirts as a novel teaching of the '023 patent [was] devised by Mr. Jones [the patentee's trial counsel] and Mr. Whang after the fact for purposes of establishing the validity of the '023 patent in the Kansas litigation."

As here, the patentee in the UBC case had devised a non-existent basis for patentability of the invention of the Whang '023 patent, and undertook by argument and testimony to convince the Kansas court of the patentability of the claims on that false basis. The court went on to chronicle the misleading conduct of the patentee which led the court to an incorrect conclusion:

> Despite this corporate recognition of the scope of the Whang '023 . . . Whang specifically testified that these modems used '50% rolloff or less.' He did so in response to a specific question posed by Milgo's counsel. Milgo let the answer stand because it helped

> to establish a 'break-through' in modem design built on narrow roll-off filters. And Milgo did more than simply let Whang stand uncorrected. Its Proposed Finding of Fact 37, which the Kansas court adopted verbatim stated [facts concerning commercial success resultant from the Whang '023 invention.]

Id. at 1178, 224 U.S.P.Q. at 152.

It was determined in *UBC* that the misrepresentations were material to the Kansas court's application of the statutory criteria and that "Milgo's misrepresentations made it impossible for the Kansas court to apply those criteria correctly to the issue before it." *Id.*

There can be no doubt that the District Court in this case was firmly convinced that the invention of the '928 patent related to a seal that enabled the creation of a high-speed and high-temperature drill bit. Indeed, the Ninth Circuit had earlier come to that express conclusion in its decision which the District Court below followed out of "comity." [A. 63].

In the *UBC* case, fraud on the court was found because of a "pattern of misconduct clearly aimed at preventing the court from making a fair and well-informed assessment of the validity and enforceability" of the patents at issue. *Id.* at 1187, 224 U.S.P.Q. at 159. When a patent case is presented to a non-technical judge in a fashion designed to purposefully obscure the technology for the purpose of convincing the court of nonexistent merits of an invention, advocacy transgresses into fraud on the court. The UBC court said:

> The controlling factors appear to be whether the misconduct tampers with the judicial machinery and subverts the integrity of the court itself. [Citations omitted] . . . [W]e believe the facts of the Milgo misconduct fall within the range of conduct prescribed by the Supreme Court in *Hazel Atlas Co.*

v. Hartford Empire Co., 322 U.S. 238 61 U.S.P.Q. 241 (1943).

Id. at 1186, 224 U.S.P.Q. 158.

The theme that Hughes has been propounding throughout this litigation, and throughout the earlier Smith litigation is so far from the real facts that it cannot be excused. The theme was starkly and simply untrue.

This Court should keep in mind that Hughes sought no small prize by its efforts. It has successfully bankrupted Smith, its principal competitor in the drill bit industry, and hopes to be many millions richer should it prevail to any extent in this case against Dresser.

B. *The Withheld Exhibit 8565 Clearly Provides A Basis For Relief Under Either Rule 59 or Rule 60, Fed.R.Civ.P.*

The purpose of Rules 59 and 60 of the Federal Rules of Civil Procedure is to redress conduct by the prevailing party which prevents a losing party from fully or fairly presenting its case. *Square Construction Co. v. Washington Metropolitan Area Transit Authority*, 657 F.2d 68, 71 (4th Cir. 1981). In *Rozier v. Ford Motor Co.*, 573 F.2d 1332 (5th Cir. 1978), the effect of a withheld document was to turn the trial into "little more than the adjudication of the hypothetical fact situation imposed by Ford's selective disclosure of information." *Id.* at 1345-46. Given the untruth of the underlying proposition of Hughes' case, Dresser is fully justified in seeking amendment of the judgment of validity of the '928 patent under Rule 59 or relief from that judgment under Rule 60(b)(6), Fed.R.Civ.P.

The holding of validity of the '928 patent is based squarely on a false proposition and is worthless. That injustice should be addressed by this Court, either by directly holding the '928 patent to be invalid based on the present record, or at least by remanding this case to

permit the District Court to fully air the truth concerning the capabilities and obviousness of the '928 patent seal.

VI. CONCLUSION

In view of the foregoing, this Court is respectfully requested to remand this case in the event that a determination of invalidity of the '928 patent favorable to Dresser has not already been made.

The Court is respectfully requested in any remand to make provision as set forth in the accompanying order that if Dresser's motion does not result in an alteration of the Amended Judgment, that the present appeal may be reinstated based upon the earlier filed notice of appeal. Absent such an order, it might be construed that Dresser would lose its ability to appeal from the Amended Judgment because any such future notice of appeal would not be timely.

Respectfully submitted,

/s/ John F. Lynch
JOHN F. LYNCH
ARNOLD, WHITE & DURKEE
One Bering Park
750 Bering Drive, Suite 400
Houston, Texas 77057
(713) 787-1400

Attorneys for
Dresser Industries, Inc.
Appellant, Cross-Appellee

Of Counsel:
M. SCOTT NICKSON, JR.
EDWARD G. FIORITO
DRESSER INDUSTRIES, INC.
1600 Pacific
Dallas, Texas 75201
(214) 740-6974

"EXHIBIT 8565" in *Smith International Inc.* v. *Hughes Tool Co.*

1974

FIELD REQUIREMENTS—ROCK BITS

OILFIELD

H. W. HARMS

HUGHES TOOL COMPANY

June 22, 1973

1974

FIELD REQUIREMENTS—ROCK BITS

The ensuing statements represent field definitions of required product development work for the coming year. Statements have been divided into Oilfield ("O" series) and Industrial ("I" series) with priorities assigned within each series. Copies are being distributed as follows:

Oilfield Only:	R. E. Bartel	J. B. Laird
	W. E. Buchan	N. A. McLain
	M. C. Fisbeck	B. J. Owen
	P. E. Green	D. E. Redifer
	K. E. Gregston	H. C. Rowland
	H. W. Harms	N. B. Thomas
Industrial Only:	John Connors	
	D. L. Garrett	
	D. L. Klingensmith	
Combined:	F. T. Alexander	V. W. Parish
	J. H. Cook	R. J. Schneider
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/s/ Joe H. Cook
JOE H. COOK

JHC:aj

PROJECT NO. 0-74-2 BY: Keith Gregston

ECONOMIC JUSTIFICATION—Cont.

The ball and roller types have indicated a trend of reduced activity. Introduction of the J66 design could allow elimination of these ball and roller designs.

An estimate of annual usage inclusive of replacing ball and roller designs with some intrusion into J55, J88, and competitive activity is as follows:

7⅞"	J66	550 Units
8¾"	J66	310 Units
12¼"	J66	300 Units

SUB-TITLE 2: BY: Keith Gregston

High RPM Journal Bearing

PROBLEM STATEMENT:

The current existing Journal Bearing designs are limited to the lower range rotary speeds (up to 70) for economic application. A drastically reduced bearing capacity is encountered as rotary speeds exceed 100 RPM. The development of a Journal Bearing which will sustain higher rotary speeds in the range of 90 to 100 RPM would promote the application of the J22 design. In addition a 100 to 150 RPM bearing capability is a prerequisite for introduction of a J11 type and plain Journal Milled Cutter types in the X3A to X1G range of drillability.

POSSIBLE SOLUTION:

Investigation and development of Journal Bearing components affected by surface contact speed and friction temperature:

(A) "O" Ring—Material and/or design

(B) Contact surface finishes

(C) Lubricants

(D) Reduced Journal diameters/Journal speed

The field "Test Vehicle" for initial evaluation of high speed Journal Bearing efforts should be the 9⅞" J22.

BACK-GROUND DATA:

Geographic areas where the high RPM Journals would have the greatest application are the Gulf Coast, Rocky Mountains, West Coast and Export.

ECONOMIC JUSTIFICATION:

Development of a high speed Journal Bearing would afford increased sales in the present X3A and X3 types. The proposed addition of a J11 design and its successful application will be dictated by our ability and the time factor in achieving a high RPM Journal capability.

The forecasted dollar sales and economic justification of this project will coincide with the proposed J2 and J11 design projects.

SUB-TITLE 3: BY: J. E. Glaser

"Hugheset" Design Softer Than J22 (J11)

PROBLEM STATEMENT:

To expand the Journal Bearing "Hugheset" bit into the soft top hole formations presently being drilled with OSC3AJ and OSC3J types the development of a J11 is necessary. Our success depends to a great extent in developing a high RPM Journal Bearing which will perform satisfactorily at rotary speeds up to 180 RPM.

PROJECT NO. 0-74-5 BY: N. A. McLain

TITLE:

Improve Seal System Reliability

PROBLEM STATEMENT:

This project is directed toward Journal Bearing insert bits. Although the performance of these bits has been generally outstanding, short bearing life and customer complaints occur frequently which are directly attributable to a malfunction of some portion of the seal or compensating system. Specific sub-titles in their considered order of importance are listed below to further define the work necessary to accomplish this project.

SUB-TITLE 1: BY: N. A. McLain

Determine if Inverted Compensators will Give Improved Performance. Develop a Compensator System Which Does Not Need Regreasing in the Field.

PROBLEM STATEMENT:

Journal Bearing insert bits are frequently pulled out of the hole with rerunable cutting structures. A high percentage (depending on the specific area and hole conditions) of these bits are found to have substantial amounts of grease lost from one or more reservoirs; fully extended and ruptured compensators are also common. If bits are pulled prematurely to run logs or for other reasons this compensator condition requires that Journal insert bits be inspected and field serviced (regreased) before being rerun. This is an inconvenience on land rigs and impossible on offshore rigs or export operations.

PROPOSED SOLUTION:

Numerous PSR tests have been run to evaluate the reliability of inverted compensator systems with no

definite conclusions reached. Further testing is required and should be made in the North Central or South Louisiana Region where unstable hole conditions often cause "drag" on trips or connections. If inverted compensator systems do not solve this problem and eliminate the need for field service other designs should be explored to find a solution.

BACKGROUND DATA:

It is noteworthy that both Smith and Security are using inverted systems for their new friction bearing lines being introduced this year. If these manufacturers can develop a bit to match our Journal bearing life with a more reliable seal system not affected by short trips or premature trips out of the hole, we stand to lose a substantial portion of this profitable market.

ECONOMIC JUSTIFICATION:

A solution to this problem of seal system reliability would probably not produce an appreciable increase in sales income; but would be expected to help us hold our present substantial level of the market for Journal Bearing insert bits. Any improvements made would also have possible application to all "X-Line" rock bits. Dollar sales for the past year are shown below.

J Series Insert Bits	$23,000,000
Seal Bearing (Roller) Insert Bits	4,000,000
Seal Bearing Mill Cutter ("X-Line" and Journal)	9,500,000
	$36,500,000

SUB-TITLE 2: BY: P. E. Green

Develop High Temperature System for Journal Bearing Bits.

PROBLEM STATEMENT:

Material now used in Journal Bearing Seal Systems is limited in regard to its ability to withstand temperatures in excess of 300°F ± 50°. Bit life is limited by bearing failure. The problem of seals being affected by temperature exists, in some deep holes drilled with mud, in most holes drilled with air and all holes drilled in geothermal exploration.

PROPOSED SOLUTION:

Develop component parts, for a seal system capable of withstanding downhole temperatures within a range of 300°F to + 750°F. The life of such a seal system would need to exceed 25 hours at the higher temperatures and 100 hours at the lower temperature.

BACKGROUND DATA:

Our ability to develop a seal system capable of economic performance in air and geothermal application would allow us to discontinue the areo type rock bit line.

ECONOMIC JUSTIFICATION:

Refer "Project #73-11—High Temperature Compact Bits" written in 1973.

Projecting present 1973 usage and trend indicates further increases exceeding $850,000.00 will be spent on compact bits used only in geothermal drilling. This market is predominantly 8¾" size.

Note: Continue testing to find material and/or method for use in Journal seals, compensators and lubricants.

SUB-TITLE: BY: S. N. Smith

Continue Investigation of Relief Valves

PROBLEM STATEMENT:

There have been increasing number of bearing failures in Journal "Hugheset" bits attributable to the pressure relief valves. The following deficiencies of the pressure relief valve have been observed: 1. Failure to operate at rated pressure. 2. Cementing shut with cement and/or cuttings when run in an air or foam drilling medium. 3. Fouling due to cuttings holding these valves open. 4. Leaking around the "O" ring valve seals.

PROPOSED SOLUTION:

Design a pressure relief valve that will eliminate the above problems. It is quite possible two valves will be needed, one for fluid applications and the other for air application. If it is found that two radically different valves are needed, they should be of such design that they could be conveniently changed by field personnel.

BACKGROUND DATA:

There have been numerous complaints registered from the Northeast U.S. Region in regard to pressure relief valves cementing shut when drilling cement in an air/foam medium or when a water bearing formation is encountered while drilling with dry air. In all these cases we have found that if the relief valves are plugged, the bearing has failed.

Complaints from other areas include the following: 1. Relief valves that open while manually depressing the compensator slightly as in regreasing a bit. 2. Loss of grease because the relief valve opens while making a short trip or connections and fails to close. 3. High internal pressures that accumulate within the bit because the valves did not open. (This is especially dangerous when the bit is to be regreased and the compensator cap is removed.)

APPENDIX F

APPENDIX F

FEDERAL RULES OF CIVIL PROCEDURES INVOLVED

Rule 26. General Provisions Governing Discovery

. . . .

(e) Supplementation of Responses. A party who has responded to a request for discovery with a response that was complete when made is under no duty to supplement the response to include information thereafter acquired, except as follows:

. . . .

(2) A party is under a duty seasonably to amend a prior response if the party obtains information upon the basis of which (A) the party knows that the response was incorrect when made, or (B) the party knows that the response though correct when made is no longer true and the circumstances are such that a failure to amend the response is in substance a knowing concealment.

. . . .

(g) Signing of Discovery Requests, Responses, and Objections. Every request for discovery or response or objection thereto made by a party represented by an attorney shall be signed by at least one attorney of record in the attorney's individual name, whose address shall be stated. . . . The signature of the attorney . . . constitutes a certification that the signer has read the request, response, or objection, and that to the best of the signer's knowledge, information, and belief formed after a reasonable inquiry it is: (1) consistent with these rules and warranted by existing law or a good faith argument for the extension, modification, or reversal of existing law; (2) not interposed for any improper purpose, such as to harass or to cause unnecessary delay or needless increase in the cost of litigation; and (3) not unreasonable or unduly burdensome or expensive,

given the needs of the case, the discovery already had in the case, the amount in controversy, and the importance of the issues at stake in the litigation. If a request, response or objection is not signed, it shall be stricken unless it is signed promptly after the omission is called to the attention of the party making the request, response, or objection, and a party shall not be obligated to take any action with respect to it until it is signed.

If a certification is made in violation of the rule, the court, upon motion or upon its own initiative, shall impose upon the person who made the certification, the party on whose behalf the request, response, or objection is made, or both, an appropriate sanction, which may include an order to pay the amount of the reasonable expenses incurred because of the violation, including a reasonable attorney's fee.

Rule 33. Interrogatories to Parties

(a) Availability; Procedures for Use. Any party may serve upon any other party written interrogatories to be answered by the party served or, if the party served is a public or private corporation . . . by any officer or agent, who shall furnish such information as is available to the party. Interrogatories may, without leave of court, be served upon the plaintiff after commencement of the action . . . .

Each interrogatory shall be answered separately and fully in writing under oath, unless it is objected to, in which event the reasons for objection shall be stated in lieu of an answer. The answers are to be signed by the person making them, and the objections signed by the attorney making them. The party upon whom the interrogatories have been served shall serve a copy of the answers, and objections if any, within 30 days after the service of the interrogatories. . . . The party submitting the interrogatories may move for an order under Rule 37(a) with respect to any

objection to or other failure to answer an interrogatory.

. . . .

Rule 34. Production of Documents and Things and Entry Upon Land for Inspection and Other Purposes

. . . .

(b) Procedure. The request [for production] may, without leave of court, be served upon the plaintiff after commencement of the action . . . .

The party upon whom the request is served shall serve a written response within 30 days after the service of the request. . . . The response shall state, with respect to each item or category, that inspection and related activities will be permitted as requested, unless the request is objected to, in which event the reasons for objection shall be stated. If objection is made to part of an item or category, the part shall be specified. The party submitting the request may move for an order under Rule 37(a) with respect to any objection to or other failure to respond to the request or any part thereof, or any failure to permit inspection as requested.

A party who produces documents for inspection shall produce them as they are kept in the usual course of business or shall organize and label them to correspond with the categories in the request.

. . . .

Rule 37. Failure to Make or Cooperate in Discovery: Sanctions

. . . .

(d) Failure of Party to Attend at Own Deposition or Serve Answers to Interrogatories or Respond to Request for Inspection. If a party or an officer, director, or managing agent of a party or a person designated under Rule 30(b)(6) or 31(a) to testify on behalf of a party fails (1) to appear before the

officer who is to take the deposition, after being served with a proper notice, or (2) to serve answers or objections to interrogatories submitted under Rule 33, after proper service of the interrogatories, or (3) to serve a written response to a request for inspection submitted under Rule 34, after proper service of the request, the court in which the action is pending on motion may make such orders in regard to the failure as are just. . . . In lieu of any order or in addition thereto, the court shall require the party failing to act or the attorney advising that party or both to pay the reasonable expenses, including attorney's fees, caused by the failure, unless the court finds that the failure was substantially justified or that other circumstances make an award of expenses unjust.

The failure to act described in this subdivision may not be excused on the ground that the old discovery sought is objectionable unless the party failing to act has applied for a protective order as provided by Rule 26(c).

. . . . .

Rule 52. Findings by the Court

(a) Effect. In all actions tried upon the facts without a jury or with an advisory jury, the court shall find the facts specially and state separately its conclusions of law thereon, and judgment shall be entered pursuant to Rule 58 . . . . Findings of fact, whether based on oral or documentary evidence, shall not be set aside unless clearly erroneous, and due regard shall be given to the opportunity of the trial court to judge of the credibility of the witnesses. . . .

. . . . .

Rule 60. Relief From Judgment or Order

. . . . .

(b) Mistakes; Inadvertence; Excusable Neglect; Newly Discovered Evidence; Fraud, etc.

On motion and upon such terms as are just, the court may relieve a party or a party's legal representative from a final judgment, order, or proceeding for the following reasons: (1) mistake, inadvertence, surprise, or excusable neglect; (2) newly discovered evidence which by due diligence could not have been discovered in time to move for a new trial under Rule 59(b); (3) fraud (whether heretofore denominated intrinsic or extrinsic), misrepresentation, or other misconduct of an adverse party . . . (5) . . . it is no longer equitable that the judgment should have prospective application; or (6) any other reason justifying relief from the operation of the judgment. The motion shall be made within a reasonable time, and for reasons (1), (2), and (3) not more than one year after the judgment, order, or proceeding was entered or taken. . . . This rule does not limit the power of a court to entertain an independent action to relieve a party from a judgment, order, or proceeding, . . . or to set aside a judgment for fraud upon the court. . . . [T]he procedure for obtaining any relief from a judgment shall be by motion as prescribed in these rules or by an independent action.